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THE TREATMENT OF BONE AND JOINT TUBERCULOSIS

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(Read before the Forty-second Annual Meeting of the Arizona State Medical Association, held at Tucson, April 20-22, 1933.)

In Europe there are still two quite distinct schools of practice in the treatment of tuberculosis of bones and joints. In America, so far as we have been able to determine, medical and surgical opinion has not yet crystalized into very definite channels. The work of the first European school is well illustrated in the surgical orthopedic clinics in the large industrial centers of Northern England. The methods of the second school are best studied in the medical orthopedic clinics in the Swiss Alps. It is true that the views of the leaders of the first school have been so modified in the past thirty years that they simulate somewhat those of the second school. There are still, however, very distinct and important differences in the views held and the practice followed by each group.

The greatest contribution which the medical school of orthopedists has made to the knowledge of this subject is in recognizing that tuberculosis of bones and joints is inherently and fundamentally a constitutional disease. This is simply following to their logical termination the conclusions reached by the brilliant Laennec more than one hundred years ago regarding "the oneness or unity of tuberculous matter."

Pathologists are quite generally agreed that tuberculosis of bones and joints is seldom, if ever, due to a primary infection. The disease is, as a rule, secondary to lymph-node tuberculosis or to pulmonary tuberculosis. This secondary infection is usually blood-borne, but occasionally may be due to direct extension from neighboring areas. In some respects tuberculosis of bones and joints bears a certain analogy to malignant tumors, but with one very striking difference. Tuberculosis of bones and joints is practically never a local infection, whereas a malignant tumor remains a localized lesion for weeks, months, and sometimes years. It is only when metastasis occurs that the disease becomes constitutional and terms like carcinomatosis are used to indicate its wide-spread character. It would seem to be just as logical to expect to cure a case of wide-spread carcinomatosis by removing one of the external tumors or a portion of an affected limb, as to cure a case of bone and joint tuberculosis by excising the affected joint and portions of the adjacent bone.

Fortunately, however, the tissues of the animal body can develop much greater powers of resistance to constitutional tuberculosis than to carcinoma. These powers of resistance enable the animal body to absorb diseased tissue and especially to limit the local lesions by the formation of scar tissue. It is on these powers of resistance, developed by the animal tissues, that phthisiotherapists depend in the treatment of pulmonary tuberculosis. Their whole object in treatment is to encourage and increase these powers of resistance. The medical school of orthopedists apply these same principles in the treatment of extra-pulmonary tuberculosis.

MEDICAL TREATMENT. GENERAL MEASURES.

REST

The first general measure used by the medical school in the treatment of bone and joint tuberculosis is bed-rest—the remedy which is producing such brilliant results in the treatment of pulmonary tuberculosis. All patients are kept on bed-pan rest until x-ray films show clearly that the local tuberculous lesion is completely healed.

FOOD

The second general measure is very plain, easily di-

gested food in quite moderate quantities. While the Herrmannsdorfer-Sauerbruch salt-free diet is being used largely in Europe in the treatment of skin tuberculosis and to a limited extent in pulmonary tuberculosis, it does not seem to have been adopted in the treatment of bone and joint tuberculosis. The diet most commonly used in this latter form of the disease is one supplying a limited quantity of meat and generous amounts of carbohydrate in the form of cereals and vegetables. Milk, eggs, and cheese are used in moderate quantities only. Rollier is quite firmly convinced that "there is a close relationship between the function of the skin as an organ of absorption and the amount of food received by way of the alimentary canal; as the former is increased, so does the latter diminish." He advocates reducing the amount of food taken and, above all, restricting the amount of meat. He uses largely a vegetarian diet, with cereals and fruits in abundance.

In America a modified salt-free diet is being used at the Cedarcrest State Tuberculosis Sanatorium at Hartford, Connecticut. Dr. Henry Stempa reports some very gratifying results, especially in cases of bone tuberculosis.

FRESH AIR AND SUNSHINE

The third general measure used by the medical school of orthopedists is the one to whose use and technic Rollier has devoted so much study and with which his name is so widely associated—general air and sun baths. To use heliotherapy to its greatest advantage, two climatic conditions are essential. The first is a large amount of intensive sunshine; the second is a cool moving atmosphere. Both these conditions are filled to an admirable degree in the higher regions of the Swiss Alps. Here, at an altitude of 5000 feet, the sun's rays are quite intense, although the latitude is 47 degrees. The atmosphere is clear and cool. This enables the patient to spend many hours a day comfortably, with the whole body exposed to the sun and air. It is a condition to which we have applied the term "air-cooled sunshine" and it is one which is quite essential to the practice of heliotherapy to its fullest advantage. If the sun's rays are less intense, the patient is deprived of the beneficial effects of its strong actinic rays and, besides, the atmosphere becomes so cool that he cannot enjoy the air bath in comfort. If the air is not cooled by winds from the surrounding areas, the sun's rays are so hot that the patient cannot remain in them with advantage.

Heliotherapy in the Swiss Alps produces three very striking results.

The first striking effect is an amazing amount of muscular development. To one who has not had a similar experience elsewhere, it must seem almost unbelievable that any person can attain such marked muscular development lying in bed. When one compares the small flabby, undeveloped musculature of the child when beginning treatment, with the large, thick, firm, beautifully developed muscles of the same child after a few months of exposure to air and sunshine, it is indeed difficult to believe that such a change could possibly take place without the use of these muscles in constant strenuous exercise. The muscles stand out like those of a trained athlete. The advantage of such muscular development in splinting and protecting diseased bones and joints can scarcely be overestimated.

While, for obvious reasons, it is quite impossible to segregate the effects of air from those of sunshine, we are inclined to regard this remarkable muscular development as due to the action of the cool moving air on the circulation of blood and lymph in the skin and underlying muscles. This impression seems to be confirmed by the marked muscular atrophy which occurs when muscles are deprived of circulating air by being covered in plaster of Paris casts for some length of time. Not only so, but no amount of exposure to sun and air will cause re-development of muscles which have become greatly atrophied by long confinement under plaster of Paris casts.

The second striking effect of sun and air baths in the Alpine region is the soft velvety condition of the patient's skin, indicating, we presume, renewed and increased functional activity in this important organ. While a somewhat similar change in the character and consistency of the skin follows sun and air treatment in all localities, it seems to us it is much more intense in the cool mountain regions. In our experience, this change occurs more noticeably in the winter than in the summer months. We are, therefore, inclined to believe that this change is brought about primarily by the actinic rays of the sun, and is greatly increased and enhanced by the cool moving air.

The third striking effect of heliotherapy in the Swiss Alps is the large amount of bone reproduction which takes place. This, in our opinion, is the factor which, in the last analysis, accounts for the fine clinical results obtained in the medical treatment of bone and joint tuberculosis. Improved powers of resistance, with increased scar-tissue formation, are essential to limiting and localizing the disease process, but, without bone reproduction, a good clini-

cal result with restored function cannot be obtained.

Moreover, the work of Hess and many others, on rickets, seems to have proved quite conclusively that it is the actinic rays which stimulate salt metabolism and cause bone production. The indications are that this is equally true in bone and joint tuberculosis. While the sanatorium regimen and the air baths certainly aid materially in limiting the disease process and in interlacing and surrounding it with fibrous tissue, it seems to be left to the actinic rays to stimulate salt metabolism, cause new bone formation and bring about a good functional result.

LOCAL MEASURES.

The local measures employed by the medical school of orthopedists may be embraced under the general term orthopedic devices and appliances. Our observations indicate that medical orthopedists have devoted a very great deal more attention to orthopedic devices and appliances than have their surgical coworkers. Their appliances have been developed along entirely different lines and seem to show considerably more ingenuity than those of the surgical school. They are simple, easily constructed, and readily applied.

All beds are fitted with hard, firm mattresses and in the case of young children and nervous adults, the body is loosely strapped to the mattress. All immobilization and extension is produced by weights and pulleys. Extension is made from quite narrow cuffs above prominent portions of the limb, connected to each other and to the pulley cord by narrow side straps. The use of closed casts, and especially those of plaster of Paris, is absolutely forbidden. Rollier states very positively that the use of plaster of Paris casts in bone and joint tuberculosis is a pernicious practice. We are very strongly inclined toward the same opinion. Such casts deprive the underlying tissues of both air and sunshine, leading in a few weeks to permanent atrophy of the muscles of that limb. As noted above, no amount of air and sunshine will restore muscular development to a limb whose muscles have been atrophied under a closed cast.

The use of narrow cuffs and side straps permits air and sunshine to come in contact freely with the skin of every part of the body, the cuffs being constructed so that they can be opened when desired. The use of weights and pulleys for immobilization and extension, permits the patient to begin active movement of the joiunt very early—in fact, soon after the initial pain has disappeared. Patients are encouraged to begin very slight active movements early, and to increase them almost imperceptibly as the lesion heals. No passive motion is used at any time.

The object of treatment of the medical school of orthopedists, is complete and permanent restoration of joint function. To what extent it is possible to achieve this happy result is well shown in Rollier's statistics and in those recently published by Garvin, showing the end results after treatment at Perrysburg, New York.

SURGICAL TREATMENT

Prior to thirty years ago, tuberculosis of bones and joints was regarded solely as a surgical disease. Fixation was produced by splints and casts. Operations of a radical nature were advocated by many surgeons. Very slowly and gradually, however, the trend of surgical opinion swung away from operative procedures, until today most orthopedic surgeons are strongly opposed to operative measures in the vast majority of cases of bone and joint tuberculosis. Two very outstanding orthopedic surgeons of Europe and America state: "The fact of the matter is, that from the point of view of general surgery the invasion of tuberculous bone by the knife, curette and chisel stirs up the process and does not remove the disease." Tuberculous bones and joints in children are almost never operated by experienced orthopedic surgeons. Operative procedures are limited to plastic work around old healed lesions, to lessen or remove deformity in an attempt to improve the dysfunction of a limb. In adults, excision of a tuberculous knee-joint is still performed in a limited number of cases, where it is supposed to save the patient time. Even the Albee bone-graft operation in tuberculosis of the spine is now opposed by quite a large number of orthopedic surgeons.

Orthopedic surgeons today limit their treatment of bone and joint tuberculosis to rest in bed in the open air with suitable nourishment, and to fixation of the diseased joint and extension of the affected limb. Their ultimate object in treatment still is strong permanent fixation of the joint. In other words, the views of the surgeon today do not differ one iota from those of his confrere of thirty years ago regarding the ultimate object of treatment. The only difference is in the methods used to procure the effects. Now, as then, surgeons are firmly convinced that a tuberculous joint is never cured except by permanent fixation, and to procure this fixation is their object in treatment.

In Northern England, patients with bone and joint tuberculosis are kept on bed-pan rest, on open

verandas day and night throughout the year. They are given good food and excellent care. The climate, however, seems to practically preclude air and sun baths. Artificial light seems to be used in comparatively few cases and somewhat spasmodically. Where used systematically, its effects are regarded fairly highly, but not enthusiastically.

Fixation and extension are obtained by use of the Bradford frame. A number of orthopedic surgeons are quite strongly opposed to the use of the weight and pulley on the ground that "a continuous pull upon a limb is a traumatic act." They prefer an intermittent pull followed by fixation and retention, and these they obtain by the use of extension cords attached to the Bradford frame. Plaster of Paris casts are never used.

The patients were well nourished and healthy in appearance. There was a noticeable absence, however, of the velvety skin and beautiful muscular development observed in the Swiss Alps. The x-ray films did not seem to us to show a large amount of bone formation. We were not able to obtain statistics regarding results, but the general attitude of the attending surgeons towards these cases seemed to be one of quite marked pessimism.

CONCLUSIONS.

1. Bone and joint tuberculosis is a systemic disease and calls first and principally for the same sanatorium regimen as pulmonary tuberculosis, whether this be applied in an institution or in the patient's home. On this general principle both surgical and medical orthopedists are now quite fully agreed.

2. In addition to this essential general treatment of the patient, local treatment to the bone and joint is necessary. If the ultimate object of treatment is permanent fixation of the joint, the methods of the surgical orthopedists may be considered. If the patient is to have a useful functioning joint, the technic of the medical orthopedists must be adopted.

3. The general sun and air bath is a very valuable adjuvant to both the general and local treatment of bone and joint tuberculosis. The cool moving air stimulates the flow of blood and lymph in the skin and underlying muscles, and so contributes largely to improved function of the skin, but even more important is the effect of the actinic rays in stimulating salt metabolism and bringing about new bone formation.

4. The most desirable climate for sun and air treatment is the one in which the heat of the most intense sun's rays is tempered by the coldest air in which one can lie comfortably in the sun, with the whole body exposed, the greatest number of hours every day. For this we suggest the term "air-cooled sunshine." In such a climate, the patient derives the maximum benefit from the cold moving air and from the intense sunshine.

5. Statistics indicate quite clearly that permanent restoration of joint function can be obtained in a very large percentage of cases of early bone and joint tuberculosis and in a very encouraging percentage, even when the disease is more advanced.

6. Suitable orthopedic appliances can easily be devised, constructed, and applied, by any physician. Neither the advice nor the assistance of a skilled orthopedist is necessary in the treatment of the great majority of cases of bone and joint tuberculosis. The technic is clear and simple and can easily be acquired by any physician, without special training or unusual ability.

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DISCUSSION

DR. SAMUEL H. WATSON (Tucson): The Doctors Flinn have very lucidly and rather concisely told us how to treat bone and joint tuberculosis. There is really nothing to add, they have covered their subject well, but I should like to emphasize two or three points they have made. They tell us of two schools of thought and designate these as (1) surgical orthopedists and (2) medical orthopedists. It might be well to emphasize that these two schools differ solely in their local or orthopedic management. They agree in everything else. One school believes that fixation of the joint must occur if a cure is to be achieved, the other school believes that a cure may and does occur with a movable, useful joint. However, the really important things in the

cure of bone and joint tuberculosis do not have to do with the local management. So I want to emphasize especially what the doctors said in drawing their very first conclusion. Listen to them: "Bone and joint tuberculosis is a systemic disease and calls first and principally for the same sanatorium regimen as pulmonary tuberculosis, whether this be applied in an institution or in the patient's home." This needs to be remembered above everything else they have said. One could carry out meticulously the dictum of either school as to local treatment and never get satisfactory results, unless one at the same time paid strict attention to the fundamentals mentioned in the authors' first conclusion. To overcome tuberculosis, general resistance must be built up. The only way it can be built up, regardless of where the disease appears locally, is by bed rest. Heliotherapy, as Doctors Flinn have told us, is a valuable adjunct or adjuvant, but only that, and I wish to emphasize this—that it is a help, at times a very great help, but never, and not in any sense, is it a specific cure, as so many seem to think. It is sad, but true, that too many these days seem to think all one has to do to cure all forms of extrapulmonary tuberculosis is to get out in the sun. We see far too many cases of bone and joint tuberculosis on exercise. Attention is focused entirely too much on heliotherapy, a mere help in the cure, to the neglect of bed rest, the main agent. It is very probable that, with proper bed rest, fresh air, and good food, without heliotherapy, we could cure almost as many cases of bone and joint tuberculosis today as we do with heliotherapy, although I should not want to have to do it, and I think it would take much longer to accomplish. Do not let us forget that, long before the days of heliotherapy, an occasional surgeon, dissatisfied because of the very poor results obtained with the surgical treatment then in vogue, and following the lead of Trudeau, began treating his so-called surgical cases as Trudeau was then treating his pulmonary cases, and got remarkable results. Dr. Wm. S. Halstead, probably the first, reported at the very first meeting of the National Tuberculosis Association, held in Washington in 1905, on some various cases of bone and joint tuberculosis which he had started treating several years before by rest in the fresh air. These cases got no direct sun, nor even air baths, only bed rest in the open air. Among other things, he said, in referring to this group of cases: "Unless acquainted with the lamentable results usually obtained in the treatment of cases such as those herewith presented, one can hardly comprehend what has been accomplished by the open-air treatment of them. In not one instance did the disease make the slightest appreciable advance after the treatment was inaugurated. The restoration of function is perfect in all save one, and in this it is excellent. That most cases of surgical tuberculosis will recover without operation, if they are given a fair opportunity in the open air, I am convinced." Remember that this was nearly thirty years ago, before the advent of heliotherapy or air bathing. These patients were treated by bed rest in the open air, but with their bodies covered up, and he obtained almost as good results as we get today. Please do not misunderstand me; I am not decrying heliotherapy. I use it in these cases and know it is beneficial, but I do want to emphasize what the doctors have said in their paper—that it is not the essential thing, as many seem to believe.

In closing my remarks,, I should like to compliment the authors on their paper and leave this thought with those of you who are going to treat bone and joint tuberculosis. You must, of course, ally yourself with either the surgical orthopedist or the medical orthopedist, one or the other. With the former, you will have joint fixation; with the latter, not. But you will cure the disease following either school, provided you remember that the fundamentals in the treatment of any kind of tuberculosis, whether bone and joint, pulmonary or "what have you" are the same—rest, fresh air, good food; and, as my good friend John Flinn first said, the most important of these is rest, and when we use the word rest, we both mean bed rest.

DR. A. K. DUNCAN (Douglas): I well remember the impression that I got in 1910 when I had the opportunity of seeing the work done in Rollier's Clinic in Switzerland. He, I believe, was the first to make popular the medical treatment of bone and joint tuberculosis. He allowed no surgical intervention beyond the occasional aspiration of a cold abscess to prevent rupture. The striking feature was the appearance of well being of his patients, especially when contrasted with the average appearance of the cases of that time that were largely succumbing to secondary infection following too much surgery. We can recall our attempts at preventing the spread of infection by swabbing the bone cavities at operation, with caustics, such as carbolic acid, to seal them against absorption. This was my first real contact with the medical treatment of these cases, and I was converted. The "air-cooled sunshine," with proper rest, diet, and prevention of deformities, has been an advance in the treatment of what used to be known as surgical tuberculosis. If you will stop to think a moment, I believe that you will be struck with the impression that in the past twenty years a radical change has taken place in the treatment of all tuberculosis; the so-called surgical tuberculosis has largely become medical in its treatment; and the old medical cases, just as hopeless in their day, largely due to the ravages of secondary infection, have become surgical, with marked improvement in the end results to all.

DR. MEADE CLYNE (Tucson): Will a tuberculous joint heal more quickly in a usable fixed position than by the other method used to get a full-functioning joint? Does not the economic question many times enter into the problem of method to be used?

DR. JOHN W. FLINN (in closing): I am sorry that I cannot give a definite answer to Dr. Meade Clyne's question as to whether a tuberculous joint

will heal more quickly in a usable fixed position than by the other method used to get a full-functioning joint. However, I am strongly inclined to the belief that a knee infection in an adult is the only form of tuberculous joint disease in which a fixation operation should be considered. This seems to be Dr. Rollier's opinion. Besides, I was amazed to hear outstanding orthopedic surgeons in England take so decided, unequivocal a stand against fixation operations, and even against the Albee operation in tuberculosis of the vertebrae. Occasionally, these men would do a fixation operation on a tuberculous knee-joint in an adult, for economic reasons.

TUBERCULOSIS FROM THE STANDPOINT OF THE PEDIATRICIAN.

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(Read before the Forty-second Annual Meeting of the Arizona State Medical Association, held at Tucson, April 20-22, 1933.)

At one period of our knowledge, tuberculosis was considered essentially a disease of adult life. Following the discovery of the tubercle bacillus by Koch in 1882, many of the lesions found in children were proved to be tuberculous. From that period on, our knowledge of childhood tuberculosis has rapidly increased. Tuberculosis has been shown to be a specific infectious disease, due to the tubercle bacillus. The heated discussions which were so prevalent at one time, have now yielded to the opinion that the individual may be infected by either the human or bovine type of Bacillus tuberculosis. Up to comparatively recent times, a large share of tuberculosis in children was of the bovine type, the organisms gaining entrance into the human body, in practically all cases, by the ingestion of raw milk from infected cows. Systematic testing of dairy cattle and the almost universal pasteurization of milk are rapidly reducing bovine tuberculosis to the status of a clinical curiosity. For this reason, the vast majority of cases of tuberculosis seen today are of the human variety. This type of infection only, will be considered in this paper.

Until recently, many clinicians held the view that tuberculous infection in adults was probably contracted in early childhood. Von Behring expressed the thought that adult tuberculosis had its inception in babyhood when he said that "adult tuberculosis is the end of a song which was sung to a candidate for tuberculosis when in the cradle." This statement and other similar statements have been interpreted in various ways. Some maintain that the primary infection takes place in the lung parenchyma in early life, that the infection spreads by the lymphatics to the hilus lymph nodes, where it remains dormant for a while, later to spread to the lung parenchyma and produce the type of disease referred to as adult tuberculosis.

Ranke compared tuberculosis to syphilis by speaking of primary, secondary, and tertiary stages. He described the primary lesion as one resulting from the first infection and located in any part of the lung parenchyma, the secondary lesion as one developing from the primary lesion but located in the hilum lymph nodes, and the tertiary as developing from the lymph nodes but located in the lung parenchyma. Evidence has accumulated which would cast some doubt upon the correctness of the above assumptions.

Opie states that children living in contact with tuberculosis have childhood tuberculosis four times as frequently and adult tuberculosis twice as frequently, as children who are not in contact. Meyers found that 50 per cent of teen-age boys and girls suffering from clinical adult tuberculosis also had definite evidence that the childhood type had existed, as manifested by calcifications.

Opie found in thirty-one cases of pulmonary tuberculosis of the adult type, involvement of tracheobronchial lymph nodes in thirteen, and a calcified nodule in nearly all the rest. This evidence, together with the fact that the adult type of disease may occur in the opposite lung from the childhood type, leads one to suspect that the adult type is the result of reinfection from exogenous sources, rather than a spreading from hilus glands.

According to Meyers, when the tubercle bacilli first infect the lung (at any age of life), there is no immunity present and, consequently, the lung tissue does not have the ability to fix or hold tubercle bacilli in their place of lodgment. Therefore, many are carried to the regional lymph nodes, where they set up disease almost simultaneously with that in the lung parenchyma. The lesions resulting from this first infection we now speak of as the childhood type of the disease. This first infection confers some immunity which results in an ability of the tissues to fix or hold bacilli subsequently gaining entrance to the body, wherever they find lodgment. Thus, instead of being swept off to the regional lymph nodes, they remain for the most part

in their place of lodgment, where they multiply and produce the adult type of disease.

The following characteristics of the childhood and adult type of tuberculosis have been presented by the National Tuberculosis Association.

CHILDHOOD TYPE

1. Usually occurs in children, rarely in adults.
2. Result of primary infection.
3. May be localized in any part of lung.
4. Tracheobronchial lymph nodes always involved.
5. Caseous lesions usually become calcified.
6. Excavation very rare, little tendency to fibrosis.

ADULT TYPE

1. Usually occurs in adults, rarely in children.
2. Result of reinfection.
3. Localization is apical.
4. Tracheobronchial lymph nodes not involved by the reinfection.
5. Caseous lesions followed by excavation and fibrosis.

The prognosis in children with tuberculosis depends largely upon the type of lesion. In general it may be said that the prognosis is good in the childhood type when the lesions, on repeated roentgenologic examinations, are shown not to be progressive, or where there is no massive enlargement of tracheobronchial lymph nodes.

The prognosis in the adult type of disease is always grave. Since the adult type is the result of reinfection, the necessity of making an early diagnosis and removing the child from intimate contact with tuberculosis in the home, is obvious.

From the standpoint of the pediatrician, tuberculosis presents a number of problems: (1) prevention, (2) diagnosis, (3) treatment.

PREVENTION

With regard to prevention, too much stress cannot be laid upon the necessity of preventing contact between the child and the infected member of the household. While the widest publicity has been given to the importance of breaking this contact, my opinion is that we as physicians are not being sufficiently insistent upon the plan being carried out. I might state that the last five cases of tuberculous meningitis which I have been called upon to see, were living in intimate contact with a tuberculous parent at the time they developed their fatal illness.

The indiscriminate hiring of strange maids and cooks is frequently the cause of a family's undoing. Even with reasonable care, this is not infrequently the mode of entrance of the disease into a family. Recently the mother of one of my patients became alarmed over the cough which her maid had developed. Examination of the maid revealed active pulmonary tuberculosis. Examination of the child revealed a very positive Mantoux and evidence of definite childhood tuberculosis in the x-ray.

Healthful living, fresh air, abundant food, properly balanced diet, mental and physical rest, and diversion, play an important part in prevention.

DIAGNOSIS

If the child with tuberculosis presented definite symptoms and physical signs, the diagnosis would be simple. Unfortunately, such is not the case. In the past, great importance has been placed upon weight. The traditional association of malnutrition and tuberculosis has caused the underweight child to be viewed with suspicion. The fallacy of depending upon this finding is amply demonstrated by the work of Hetherington, and more recently by Opie, who found that the child with tuberculosis is just as apt to be overweight as underweight. Weight cannot be used as an index of tuberculous infection until the disease is so far advanced that it has undermined health.

Symptoms may be entirely lacking, even in a child who has an extensive involvement of the tracheobronchial lymph nodes, and whose disease may be progressive. The child who has repeated colds and upper respiratory infections should certainly be suspected of having tuberculosis. Perhaps the commonest complaint is lassitude. It is not normal for a child to be tired without excessive exertion. When a parent brings a child to me complaining that he is tired all of the time, I try to make it a rule that the patient does not get out without a Mantoux being done.

In my experience, cough has not been a symptom of any great diagnostic value in childhood tuberculosis. In the adult form and where the glands are sufficiently enlarged to produce pressure symptoms, it is of more value.

The heat-regulating mechanism of children is so unstable that fever does not have the same significance that it does in adults. A persistent daily rise is, however, sufficient to warrant careful investigation.

The physical findings in childhood tuberculosis rarely enable the examiner to make a diagnosis.

Since the symptoms and physical findings rarely lead to a diagnosis, obviously we must depend to a large extent upon the history, the tuberculin reaction, and the x-ray. In fact, the diagnosis cannot be

made without the last two. There are now two methods of giving the tuberculin test. The Von Pirquet, or scarification, method and the Mantoux, or intradermal, method. Because of its greater accuracy, I can see no justification for using any other method than the Mantoux. A negative reaction with .1 mg. of tuberculin can be interpreted as absence of infection, except after acute febrile diseases, and during the pre-allergic period.

After the invasion of the body by the tubercle bacilli, the resisting forces of the body become active and allergy or hypersensitiveness appears and, with it, reaction to tuberculin. For a varying length of time after invasion, there is no detectable change or reaction on the part of the tissues. During this period we have no method of determining infection. It may be as short as a few days or continue for eight weeks. This period is called the pre-allergic time. During this time the Mantoux remains negative. The intensity of the tuberculin test may be significant. Usually, the more intense the reaction. the graver the infection.

Since 85 to 90 per cent of children acquire a positive tuberculin reaction by the time they are 15 years old, and since our diagnosis rests upon the tuberculin reaction and the x-ray, it is obvious that great care must be exercised in the interpretation of the x-ray plate. Only about 1 or 2 per cent of children who have had a primary infection, as evidenced by a positive Mantoux, later have trouble referable to tuberculosis. The enthusiast who acquires an x-ray and a tube of tuberculin and goes about looking for tuberculosis, is certainly going to create havoc in the community.

The most common primary lesion of the lungs is a focal nodular lesion. It frequently becomes caseous and later either calcifies or disappears entirely. It cannot always be demonstrated in the x-ray. After it becomes calcified, its identification is much easier. The ease with which the tracheobronchial lymph node enlargement can be demonstrated depends upon the degree of enlargement and the amount of calcification present. Caseous nodes with no calcification are not visible in the x-ray unless there is massive enlargement.

TREATMENT

The treatment of children with tuberculosis depends upon a number of factors, and consists largely of rest and time. There is no question regarding the indicated treatment of a child ill with gross, clinically manifested tuberculosis. He must be institutionalized. The institutionalization of children for long periods should be avoided if possible. Children who remain in institutions for long periods usually develop inferiority complexes which hinder future initiative, and the wreckage of their minds is as great as that of their bodies.

Children in whom some calcification of lymph nodes is present, usually do satisfactorily under a modified rest program or in open-air schools. My opinion is that they, in order not to become warped individuals, should be allowed as much freedom and activity as is consistent with steady progress. The child with a positive Mantoux but no symptoms referable to tuberculosis and whose x-ray reveals no definite lesions, requires no special treatment.

The traditional association of malnutrition and tuberculosis in the minds of the laity is not without foundation. Too frequently children with the above conditions are markedly underweight. It has been my practice to give these children extra rest periods and a high caloric diet. If this is not sufficient to produce the desired results, then their activities are limited to school only. The child eats breakfast in bed, remains there until school time and goes back to bed on his return from school, eating supper in bed. One patient gained 12¾ pounds in three months on this program.

Last but not least in the treatment, is removal from contact with active disease. The only gratifying thing about tuberculosis is the rapidity with which children recover when removed from a tuberculous household.

DICUSSION

DR. SAMUEL H. WATSON (Tucson): I think I can heartily endorse about everything Dr. Sherrill has said in his paper, except one thing—he recommended institutional treatment for these little children. I am just as strongly opposed to the treatment of these little patients in institutions as I am in favor of institutional treatment for older patients. It is all wrong. The one advantage of a good sanatorium in treatment is education and community of interest. You cannot educate these children so that they will carry on, and community of interest means nothing to them. A grown person must be responsible for their care and see that they do what they should. If one could have a special nurse for each child in an institution and educate that nurse and be able to send that nurse home with the child when ready to go home and carry on at home, it would be all right—but that is not possible. So the thing to do is to educate an adult at home to watch and care for the child in the beginning, and this person can see that the child carries on to the end.

REFRACTIVE ERRORS IN THEIR RELATION TO GENERAL MEDICINE.

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(Read before the Forty-second Annual Meeting of the Arizona State Medical Association, held at Tucson, April 20-22, 1933.)

The eye, being the organ of vision, serves, after the absolutely vital organs, perhaps the most useful and necessary function in all human life. It is rarely a perfect organ, and is subject to wide variations in its functional capacity. In its effort to overcome some of its shortcomings, certain local and remote complaints arise which concern all physicians, regardless of their special field. Being an external organ and transparent in parts, it is a veritable storehouse of information in diagnosis. This paper will stress its functional variations and the symptoms and results arising therefrom.

A perfect eye is one which is able to see distant objects clearly without expending any energy; that is, parallel rays of light entering the pupil should be brought to a sharp focus on the retina. Very few individuals can do this without some effort and a great many cannot do it even with considerable effort. It is not true that the present generation has weaker eyes than its predecessors who lived a more simple existence. Greater demands are being put upon the eyes now than formerly, and thus there is more strain and, consequently, more symptoms are produced.

The imperfectly functioning eye as a cause of human suffering is now generally known to the medical profession and the public. This has led to a more universal attention to the eyes in certain complaints and thus a greater proportion of the population are wearing glasses for better vision and greater comfort.

Eyes generally are too long, or too short, so that parallel rays of light come to a focus in front of the retina, or behind the retina. The long eye is myopic (nearsighted); the short eye is hyperopic (farsighted). These same conditions may be brought about, though rarely so, by a weakness of the refractive system, chiefly in the cornea, or lens; that is, the curvatures of these structures may be insufficient to bring rays of light to a focus at the proper point.

Frequently the curvature of the cornea, or lens, is not the same in two or more meridians, in which case rays of light coming from the vertical part and rays coming from the horizontal part of the object gazed at will not come to a focus at the same place. The object is blurred and we call this astigmatism. In nearly every eye, one or two of these conditions exist. If present to a small degree, no symptom or inconvenience results.

Hyperopes, due to the presence of the ciliary muscle in the eye, may compensate for the deficiency by increasing the refractive power of the lens, and maintain good vision. Their ability to do this, however, depends on the amount of hyperopia, their age and state of health. One who could overcome it at 20, may not be able to do it at 30, or if there has been a breakdown in health. The myopes have no compensating mechanism. They have good near vision and poor distant vision. Astigmatics improve their vision to some extent by approximating their lids, thus creating a narrow slit through which light rays pass into the eye.

As a rule, young people are less affected by eye strain than older ones. The character of work is important: whether it is out of doors, or in an office; also, the amount and character of the illumination. The state of health is perhaps the most important thing of all. An individual who went along perfectly well while in good health, complains bitterly of eye strain when overtaken by some acute or chronic illness. This fact explains why so many people throw away their glasses after using them a while. (There are, of course, other reasons for this habit.)

As age advances to the fortieth or forty-fifth year, the crystalline lens has lost so much of its elasticity that it is difficult or impossible for it to increase its curvature so that divergent rays of light (reading, sewing, etc.) can brought to a focus on the retina. In other words, there is accommodative failure. This is called presbyopia and necessitates the wearing of convex lenses while doing near work.

Perhaps the most fertile field for our attention is with chlidren. The school child is fairly well supervised as to his vision. However, a school card showing normal vision does not always mean that the child has normal eyes. He may be under a terrific strain to maintain good vision, which may account for poor grades because of his reluctance to strain his eyes at hard study.

The pre-school child has no supervision except that furnished by the family physician. Most squints begin at about the second or third year. They near-

ly always have hyperopia and hyperopic astigmatism as a background. As a rule, they are periodic in the beginning, becoming constant later, if nothing is done. A proper refraction and wearing of glasses in the beginning will keep the eyes straight.

If the squint is allowed to become constant, and as the child becomes older, it becomes increasingly more difficult to effect a cure with glasses. In addition to this, the squinting eye is not being developed functionally and will remain undeveloped if not attended to early in life. This becomes of considerable economic importance to the individuals in later life, when they seek employment where good vision is required. It is not necessary to wait until the child is old enough to cooperate to have an examination made. By using atropine and the retinoscope, a fairly accurate refraction can be accomplished. We frequently see young adults with a high degree of refractive error and very poor vision, which does not improve very much when the correct glasses are prescribed. This is due to poor development of retina and visual centers. These people, if refracted early in life would have developed acute vision.

Aside from the local symptoms of refractive errors, such as styes, crusted lids, inflamed and burning conjunctiva, excessive lacrimation and a feeling of fatigue in the eyes, headache is the most prominent symptom. Elderly people have it to a lesser degree than younger people. Its most frequent site is behind the eyes and the frontal area. It is more apt to follow prolonged use of the eyes for close work, and more likely to be present as the day wears along.

As we know, dizziness and nausea may accompany the headache, which may be the beginning of a vicious circle bringing to the fore many other symptoms and complaints which, at first thought, would seem to be far removed from the eye. In addition to the pure refractive errors which I have mentioned, the eye has other imperfections which cause a certain percentage of the symptoms of eye strain. I refer to the extra-ocular muscles. Generally they are fairly well balanced so that the two eyes are held straight and focus on the same object. Occasionally, however, there is a tendency for one eye to deviate and it is held in line only by our well-developed tendency for binocular vision. In these cases, then, there is supplied an extra amount of nervous energy to the muscle concerned. This may soon result in fatigue symptoms more severe than those arising from refractive errors. To go thoroughly into the examination of a suspected refractive error, calls for both time and patience. A searching history should be obtained. Frequently from this alone one is able to predict the probable outcome.

Strong cycloplegics—i.e. atropine or scopalamine—should be used on young children except in myopes, where homatropine may be used. Homatropine suffices for older children and adults up to the forty-fifth or fiftieth year. After this time, when we are no longer concerned with an active accommodative apparatus, a milder preparation, such as cocaine or euphthalmin—which dilates the pupil only and is evanescent in its action—may be used. After the fortieth year, before using homatropine or any other substance to dilate the pupil, it is advisable to rule out glaucoma. This being done, I can see no harm in the use of these drugs.

By so placing the accommodation at rest and dilating the pupils, we are not only determining the true refraction, but we are better able to examine the lens, vitreous, and fundus, for abnormalities and evidence of systemic diseases which so often manifest themselves in the eye. In doing these things, we are frequently of service to the patient and family physician. A diagnosis of a systemic condition is frequently made or suggested. Local pathology, instead of a refractive error, may be found necessitating treatment; or, the findings may be of such a nature that the patient can be frankly told that neither glasses nor treatment would be of benefit.

DISCUSSION

DR. A. E. CRUTHIRDS (Bisbee): We, at times, and our patients, often, are prone to regard the eye as being separate and distinct from the rest of the body. Dr. Franklin's paper is timely in that it points out how refractive errors of the eye may affect the rest of the body; and how diseased conditions of the body may affect refractive changes in the eye. This is brought out very clearly in cases suffering with diabetes. Duke-Elder in 1925 reported three cases of diabetes showing sudden changes in refraction; the first one was especially interesting from this point of view. The patient's blood was estimated at intervals over a period of six months, and it was found that a myopic change accompanied the increase in blood sugar, while a hyperopic change accompanied a decrease in blood sugar, with almost mathematical precision.

Middle-aged patients may complain that distant objects have recently become indistinct; while newspaper print or sewing, for which glasses had previously been necessary, can now be distinguished more clearly without aid. In such cases as these, the oculist should direct his attention to the examination of the urine, which may reveal an advanced diabetes, yet, the patient may not know there is any change in his general condition.

Errors of refraction may have some bearing in

aiding in the diagnosis of the following: headaches, vertigo, insomnia, digestive disturbances, nervous exhaustion and hysteria, backward and highly nervous children, lateral curvature of the spine and mal-position of head.

Headache is the most frequent symptom found with refractive error as its cause; however, there is no absolutely typical headache produced by refractive errors. The most frequent type of headache is the frontal, with a feeling of constriction about the head, coming on generally in the afternoon after prolonged close work, or after a picture show, driving a long distance, or riding on a train. It has been said that morning headaches are not of refractive error origin; however, morning headaches may be produced by an unusual strain the evening before. Headaches due to eye strain also may come on in paroxysms a week or so apart.

Another condition that may be of ocular origin is vertigo, a disturbance of equilibrium. Dr. Isaac Jones classifies causes of vertigo as follows: (1) lesion in the ear, (2) lesion of intra-cranial nerves from the ear, (3) cardiovascular disturbance, (4) toxic, (5) ocular—i.e., a lesion in the eye-muscle nuclei and associated fibers.

Ocular vertigo occurs when there is a recent paralysis of one or more of the ocular muscles resulting from the interruption of the nerve supply of the muscles; it also occurs with ocular muscle imbalance, as well as in many cases of refractive errors and eye-strain. Patients with ocular vertigo obtain relief while the eyes are closed, thereby proving that the vertigo was due to refractive errors or ocular muscle imbalance.

Insomnia is frequently caused by eye-strain; it is also common for a patient with an error of refraction to say that he can not stay awake if he attempts any close work.

Digestive disturbances, such as nausea and vomiting, may be due to errors of refraction, and cases of constipation have been known to clear up with no other change than correction of refractive error.

Cases of nervous exhaustion, or so-called "nervous breakdown," may have part or all of their origin in an uncorrected error of refraction. Cases of hysteria may be traced to constant eye strain.

When we find backward and highly nervous and irritable school children, we should thoroughly check their vision. This testing should be done under a mydriatic, for the constant change in the focal distance in the eye whose focusing power has not been eliminated makes accurate correction of the error highly difficult, if not impossible. After proper correction, many children will not be under a terrific strain, as mentioned by Dr. Franklin, and will get better grades, become less nervous and irritable, and learn with more ease.

Lateral curvature of the spine and mal-positions of the head may be thought by many to belong entirely to the realm of the orthopedics, but these conditions may be brought about by the patients' assuming certain twisted positions of the head or body so that near or distant objects may be more clearly seen. These mal-positions may be assumed because of some muscular imbalance or refractive error which, if properly corrected early, may be permanently cured.

Now let me thank Dr. Franklin for the opportunity to discuss such an instructive paper, and let me repeat that errors of refraction or ocular imbalance may have some bearing in the diagnosis of the following conditions: persistent headaches, vertigo, insomnia, digestive disturbance, nervous exhaustion and hysteria; backward and irritable school children; and cases of lateral curvature of the spine and mal-positions of the head.

GAS GANGRENE: CAUSES AND TREATMENT

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(Read before the Forty-second Annual Meeting of the Arizona State Medical Association, held at Tucson, April 20-22, 1933.)

There is no more serious complication of compound fracture or other wounds than gas gangrene. Though the disease was probably known to the ancients, it remained for Maisoneuve, in 1853, to be author of its first classic description. During the next forty years it was occasionally mentioned in medical literature, being called "putrefactive phlegmon" or "fulminating gangrene," all writers agreeing that the condition was accompanied by more severe symptoms, local and general, than any other malignant infection. The paucity of references, however, to so distinct a malady, would indicate that it has always been among the rarest of human afflictions.

In 1892 Welch described the B. aerogenes-capsulatus. A year later Frankel, from clinical and experimental evidence, declared this organism to be the cause of gas gangrene.

Cramp's paper in 1912 was of clinical interest chiefly as an exposition of treatment, his conclusions being based on 187 collected cases, in which the mortality was 48 per cent. Early amputation where possible, deep multiple incisions followed by continuous irrigations where the location of the infection prohibited amputation, were the essentials he emphasized. His conclusion was that the untreated case was always fatal.

Kenneth Taylor in 1916 was the first to remark the relatively weak toxicity of Welch's bacillus. His investigations suggested the possibility of the presence in the process of other toxic agents, though he

himself explained the characteristic morbidity on a mechanical basis. His view was that the infection was limited to muscle tissue, and that mechanically, by increasing pressure of retained gas within the muscle sheath, circulation was shut off and death of tissue followed.

But the entire subject remained comparatively obscure until brought into the lime-light by the unprecedented number of cases occurring during the World War. Welch's bacillus (more scientifically called B. perfringens) was still considered the sole infective organism and a serum specific for it was soon developed, which, as an aid to treatment, was a surprising disappointment. Chiefly to French investigators, working with the abundance of material found in army hospitals, must credit be given for establishing the polyspecific nature of the infection. Weinberg and Seguin showed that, though the B. perfringens was present in nearly all instances, other organisms were always associated with it. Another French observer, Sacquepee, after much study became convinced that B. perfringens of itself was incapable of producing a potent toxin. The conclusions of these workers was that the disease was due to a combined bacterial invasion and that the variance in clinical manifestations exhibited in series of cases was attributable to the predominance in the infection of one or another of certain microbes, viz: (1) Bacillus perfrigens, (2) vibrion septique, (3) B. oedematiens, (4) Bacillus sporogenes. Recognition of this fact led to the production of a polyvalent serum. As to its efficiency, Sacquepee reported a series of serum-treated cases with a mortality of 13 per cent, while, in the same region, mortality without serotherapy was 75 per cent.

Present-day conception of the subject is one of increasing complexity in all its phases, which accounts for the fact that the U. S. Bureau of Vital Statistics does not as yet consider it a disease entity. The diagnosis "gas gangrene" is not acceptable as cause of death. An enlarging number of anaerobes have been included in the etiology until now at least 50 strains are considered potentially causative factors. However, Larsen and Pulford name three organisms for serious consideration, the same pointed out in wartime by the French as chief offenders:

1. B. perfringens, found by Vincent in 82 per cent of cases. It is the great gas producer. Requires glycogen for food, which it finds abundantly in muscle tissue. Symbiosis with aerobic saprophytes results in greater toxicity.

2. Vibrion septique. Produces little gas but a potent toxin. It attacks connective tissue and serous linings, and spreads along blood vessels and lymph channels.

3. B. oedematiens—is not found migrating far from the point of inoculation. The toxin it produces causes an intense white edema, often so extensive as to obscure the underlying interstitial emphysema.

For the most part, the numerous other organisms associated in these infections are believed to be nonpathogenic. Many are putrefactive and proteolytic, their presence being responsible for the offensive "decaying meat" odor of the discharges.

The distribution of these microbes is explained by the fact that they are largely of fecal origin. Being commonly found in the intestinal tracts of man and the lower animals, they abound in fertilized soil and street dirt. Also, they are recovered in cultures made from animal products such as hair and hides, more especially wool, woolen blankets and clothing. The most pathogenic are spore bearing, and ordinary boiling or steam cleaning does not kill the spores. None of these organisms shows ability to become established in living tissues, but, given a foothold in tissues devitalized by crushing, bruising injuries, their advance is overwhelmingly rapid.

The pathologic changes, too, are variable, though certain characteristics of the morbid process are fairly constant. Invasion of the muscle is typical. The infection travels easily from end to end but finds difficulty in passing from one muscle to another. There seems to be no effort on the part of the body to combat this invasion. There is no definite line of demarcation, no leukocytosis nor leukocytic infiltration as a barrier to its spread. Instead, an intense serous effusion precedes the bacterial invasion into the tissues. Rapid hemolysis of red cells takes place. The microscopic picture of the infected muscle shows, first, separation of muscle fibers from the interstitial tissue by a clear edematous fluid. Then the sarcolemma becomes indistinct and disappears, and finally the fibers themselves undergo a gelatinous degenerative change. Just ahead of the involved muscle are intermuscular planes filled with serum. Organisms cross these edematous planes and successively attack contiguous muscle.

Another process closely follows that of serous exudate, namely, formation of gas due to breaking down of the sugar-content of the involved muscle. This gas is non-toxic but adds to tissue destruction by mechanically producing ischemic gangrene. Gas retained within the muscle in which it is generated has been shown to attain to as high as 23 pounds of

pressure. "Gas is not found in appreciable amounts early in the infection. Its presence is certain proof of a well-developed lesion." In cases coming to autopsy, a liver foamy with gas bubbles is a characteristic and fairly constant finding.

In civil practice the incidence of gas gangrene most frequently is as a complication of compound fracture. Second in order of frequency it is found as complicating lacerated, crushing wounds of muscular regions of the body. Operative wounds, gunshot wounds, even puncture by hypo-needle have been noted as the starting point on numerous occasions. A comparatively small number of non-traumatic cases are constantly being reported, complicating such conditions as gangrenous appendix, obstetrical and gynecological operations, and so forth. The Industrial Commission of this State informs me that there have been but two cases in their records since the inception of the Commission. Neither terminated fatally. To date, at least, it does not appear to be a major hazard in industrial surgery in Arizona.

Since the progress of the disease is rapid and its termination in the untreated case invariably fatal, prompt diagnosis is the prime requisite for successful treatment. According to Boland, suggestive signs may be noted as early as six hours or as late as three days, the average being about twenty-four hours. There is no dependable first sign, such as pain in appendicitis, but early diagnosis can be made from: history of a recent wound; rapid pulse, the rate being considerably higher than the temperature would suggest; swelling in which crepitus may be both felt and heard; a thin sero-sanguineous discharge with characteristic fetid odor; and lastly, roentgenograms will many times show the presence of gas in the wounded area before it can be otherwise detected.

Local swelling, as a rule, is pronounced, due to subcutaneous edema—a peculiar white edema which does not pit on pressure. Serum-filled blebs appear near the wound edges. Of the four cardinal symptoms of inflammation, swelling and pain are in evidence; the other two, redness and heat, being conspicuously absent. Severe constitutional reaction to the infection accompanies the local disturbance, but it has been often noted that, even in the most toxic cases, the mentality remains acute almost to the end. It is useless to wait for cultures to confirm the diagnosis, for, unless diagnosis and treatment are both promptly decided, the outcome is fatal.

During the World War the use of antitoxin as a prophylactic against gas gangrene in cases selected because of the severity of their wounds, was considered to have resulted in a notable drop in the occurrence of the disease: from 7 per cent at the beginning to less than 2 per cent at its close. Ivens reported results obtained in 433 severely wounded. When the serum was given within twenty-four hours of the injury, at or before the time of the first operation, there were no deaths due to gas gangrene.

Surgical prophylaxis is concerned with thorough debridement to remove foreign matter, such as soil or clothing, and especially devitalized muscle and blood-clots. Delayed primary closure of such wounds is an essential precautionary measure.

Whether in prophylaxis or in the treatment of actively infected cases, serotherapy supplements, but cannot replace, surgery. As soon as the diagnosis of anaerobic infection is made, 200 cc. of the polyvalent serum should be given intravenously and repeated at least once within twenty-four hours. This, as a rule, is followed by marked clinical improvement. In any event, whatever surgical treatment is indicated should next be done without delay. The infected areas, with all dead tissue, are removed—by excision if located on the trunk or buttocks; by amputation if of an extremity. The Medical Department of the United States Army gives four indications for amputation in these cases: (1) extensive laceration of soft parts; (2) extensive compound fracture; (3) self-evident gangrene, or division of large arteries, or (4) early development of general toxemia. If indicated, it should be done immediately. "Only the plane, not the time of operation, is to be determined." It should be made well above the involved area, through healthy contractile muscle. Whether wound excision or amputation is performed, no attempt at wound closure is made. In the after-treatment of the wound, anaerobic conditions should be eliminated as far as practical: the dressing should be made light to admit air, loosely applied to avoid constriction. "Open-air treatment" under a cage is excellent wherever possible.

In combating constitutional symptoms, a progressive anemia and general toxemia must be met. Fluids in large quantities, possibly insulin-glucose intravenously, are best measures against the toxicosis. The secondary anemia due to hemolysis may become so marked as to demand transfusion.

A generally accepted fact of prognostic importance is that the longer the interval between time of inoculation and onset of symptoms the less virulent will infection prove to be. Also, the United States Army teaches that "cases in which the trunk and buttocks are involved are more serious than those

of the extremity, where prognosis becomes more favorable as the tip is reached." Maes stressed the importance of location as affecting prognosis. In his own comparatively wide experience, he has never seen recovery after amputation of the upper extremity for gas gangrene. His explanation is that in wounds of the calf there is extension to the knee, then a temporary halt because practically no muscles cross the knee; whereas, in the upper extremity, both elbow and shoulder are literally wrapped up in muscle. Millar, in a recent comprehensive review of collected cases in civil life, taken from the Lister era to 1931, finds the mortality 49.7 per cent. The American Expeditionary Force had a death rate of 48.5 per cent.

CASE REPORTS

CASE I. On March 25, 1925, a Mexican boy 6 years of age was admitted one-half hour after sustaining a compound fracture of the left wrist. This was reduced with full observance of antiseptic technic. On the second day, 36 hours after the injury, an immoderate swelling and unusual fetid odor were noted. Smears were positive for Welch's bacillus, but the parents refused amputation. Multiple deep incisions were made into all flexor muscles of the forearm; the muscular tissues were tense and bulged into the fascial incisions. Continuously wet dressings of permanganate solution were applied. Twenty-four hours later an intense edema extended half-way from elbow to shoulder and subcutaneous crepitus could be elicited even over the shoulder girdle and pectoral region. His general condition was critical. Under gas-oxygen anesthesia, amputation was done three inches below the shoulder joint. This wound was given the open-air treatment on the porch. Recovery was rapid and complete. Soil, in this case, was probably the contaminating agent.

CASE II. A Mexican miner past fifty years of age was injured November 11, 1928, by fall of a solid piece of rock in the lime quarry. Estimated weight of the rock was about two tons and it dropped 20 feet. His right hand was caught and completely severed above the wrist, and the lower half of the right leg was mangled. Upon admission to the hospital at 3 p. m., debridement was done under gas anesthesia. Because of shock, further surgery was postponed until the following morning, when amputation was made 6 inches below the knee. Forty-eight hours later, gas bacillus infection was suggested by a foul-smelling discharge, and emphysema of the tissues was found extending well up onto the thigh. Smears showed the B. perfringens to be present. The amputation wound thereupon was widely opened, necrotic muscles were excised until bleeding was encountered. Irrigations and wet dressings of potassium permanganate solution comprised local treatment. For several days, further excision of gangrenous tissue was done at each dressing, until all muscles in the stump had been removed. After a week of stormy convalescence, marked and permanent improvement was established. Secondary amputation above the knee followed in three weeks. Woolen underwear, literally ground into the wound, was considered the source of contamination.

Neither of these cases received the benefit of sero-therapy because serum in neither instance was readily available.

CONCLUSIONS

The experience of the World War proved the validity of previously conceived ideas that, muscle being the seat of the infectious process, excision of involved muscle together with wide incision of its fascia, is rational treatment. To the war also, we are indebted for the polyvalent serum, as well as a conception of the relative value of serotherapy. More radical attack on the infected muscle, combined with serotherapy, does result in more conservative subsequent amputation.

Gas gangrene, though a comparatively rare condition in civil practice, is doubtless on the increase, due to the growing number of street and highway accidents of violent nature. Because of its obvious seriousness, more publicity, particularly in medical circles, might well be given the subject. Serotherapy should be emphasized. We rightly expect the supply houses of large cities to be adequately stocked with the serum, but might not the suggestion be in order that a quantity sufficient to treat at least one case, together with one or two prophylactic doses, be made part of the standard equipment of hospitals or first-aid stations remotely situated from the larger centers?

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TRANSURETHRAL PROSTATIC RESECTION FOR PATIENTS WHO CONSTITUTE POOR RISKS.

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(Read before the Forty-second Annual meeting of the Arizona State Medical Association, held at Tucson, April 20 to 22, 1933.)

Perusal of the relevant literature will substantiate the view that the present status of transurethral surgery is the result of the efforts of many persons, each of whom has added a little to his predecessor's experience, either in regard to clinical application or instrumental development. These persons include physicists, machinists and manufacturers, as well as surgeons. It is only necessary to mention Mercier, Bottini, Freudenberg, Luys, Wishard, Young, Caulk, Stern, Davis, McCarthy, Braasch, and Bumpus, to recall the fact that the transurethral attack on the prostate gland is not new, and has been under way for more than a hundred years.

Luys[5], of Paris, undoubtedly was the most persistent advocate of the transurethral method of treating extensive prostatic hypertrophy. His operation, "forage of the prostate," was probably the first in which removal of the obstructing portions of large lateral lobes was accomplished. He began his work in 1909, and published his first data in 1913. Technical difficulties, resulting in imperfect visualization, were encountered by other surgeons, and restricted widespread development of the method.

In this country, Caulk[6] has been the principal advocate of the transurethral operation for extensive prostatic hypertrophy. His cautery punch modification of Young's instrument has been used by many surgeons, few of whom have met with success in operating on other than small glands. Visual difficulties also restricted widespread use of the method. A lens attachment[7] recently has been added to Caulk's punch, which will, in some measure, lift this restriction, allow removal of much more tissue, shorten convalescence, and eliminate second operations in many instances.

The invention of the resectoscope by Stern, and its further development and application by Davis, revived the interest in transurethral resection. Caulk and Davis deserve the greatest tribute for their parts in extension of this form of surgery to the majority of cases of prostatic hypertrophy.

The knife punch, as used at present at The Mayo Clinic, is the result of many years of effort by Braasch and later by Bumpus,[3] who modified a direct-vision cystoscope, placing a fenestrum in it, similar to the one in Caulk's punch. Bumpus' zeal aroused the suggestions of various workers in the Section on Urology, of urologists elsewhere, and of the instrument maker; these suggestions have led to the development of the present efficient model.[12] Bumpus' versatility in using any resectoscope is unequalled, as his reports[3, 4] will testify, but he prefers to operate with the knife punch. This instrument, in my opinion, surpasses any other for prostatic resection, and as Luys[10] has stated: "I cannot too much insist upon the fact that direct vision cystoscopy is preferable to every other, for it alone permits any therapeutic action to be direct and harmonious without any intermediary."

There should be no dispute about this, however, for the instrument the surgeon chooses is of secondary importance to his ability to remove the obstructing tissue. A surgeon unfamiliar with landmarks at the neck of the bladder has no right to attempt prostatic resection, and would do better to continue to perform prostatectomy, for his mortality rate will be disappointing. On the other hand, I am firmly of the opinion that a surgeon who can recognize certain important features of prostatic enlargement, can operate on patients who are extremely ill, with a low death rate. If a surgeon resects within a certain limited field, and is discreet in postoperative care, the procedure is as safe as any major surgical operation. At The Mayo Clinic, therefore, we have not denied any patient whose renal function was even fair, and who was still able to get out of bed, the benefit of removal of obstructing prostatic tissue. During 1932 only two patients were sent home to continue with drainage by urethral catheter. One patient had an extensive prostatic carcinoma; the other had suffered recent cerebral hemorrhage, and was more than eighty-five years of age. At the clinic we have resected the prostate glands of many patients who, because of coincidental disease elsewhere in the body, would ordinar-

ily be considered as constituting poor risks. I might add that, during 1932, 276 patients underwent transurethral prostatic resection, and only thirty-nine prostatectomy. Prostatectomy was performed only twice after August 1, whereas transurethral resection was performed in 142 cases. It is also important to add that in not a single case did failure of transurethral resection necessitate resort to prostatectomy.

When enumerating the associated diseases which add to the risk of operations on the prostate gland, the first to consider are those of the bladder and kidney. Such disease may be coincident with obstruction at the vesical neck or the result of it. Renal insufficiency, caused by back-pressure or infection, was present in 22 per cent of cases, as evidenced on admission by values for urea of more than 50 mg. in each 100 cc. of blood. The highest value for urea noted was 381 mg. for each 100 cc. of blood, and, contrary to my expectations, this patient, after preliminary drainage by cystotomy, withstood prostatic resection without incident. In many of the cases ureteral reflux could be demonstrated, and one patient with bilateral hydro-ureter and hydronephrosis was operated on safely. Another patient with unilateral reflux, who suffered renal colic at each voiding, was completely relieved when the prostatic obstruction was removed. In another similar case, nephrectomy early in postoperative convalescence was necessary because of recurrent fever and chills, caused by severe recurrence of the renal infection. Tumors of the bladder were present in two cases, and were destroyed by electrocoagulation at the time of resection. In a number of cases, resection and litholapaxy were performed at the same operation.

The presence of diverticulum of the bladder, in most instances, is a serious complication, and unless the diverticulum empties when the bladder is empty, diverticulectomy, preliminary to transurethral resection, is probably the best procedure. Cabot, however, has stated that he can think of no serious objection to preliminary removal of the obstructing prostatic tissue, as far as later surgical attack on the diverticulum is concerned, should it be necessary. On that basis, we have, in three cases in which suprapubic operation seemed to carry inordinate risk, removed the prostatic tissue and let the diverticulum remain. Postoperative convalescence was uneventful and normal urination was established, but, of course, one cannot be certain that diverticulectomy has been permanently avoided.

Malignant change in the prostate gland is a grave complication of obsruction of the vesical neck, usually not for immediate reasons, but certainly from the prognostic standpoint. During 1932, thirty-eight patients with prostatic carcinoma were completely relieved of their symptoms of obstruction by transurethral resection, and despite the extreme difficulty occasionally encountered, not a single patient was seen, in operating on whom it was impossible to pass the resectoscope. Prostatic resection, I believe, offers more comfort to the patient with prostatic carcinoma than any other method of relieving the obstruction. Even in cases in which metastasis is already present, the relief of urinary difficulty by this method can well be considered. Because of objections to catheterization, and at the insistence of relatives, resection was performed on a man with extensive involvement of the spinal column, thus enabling him to void freely until his death, seven months later.

Cardiovascular disease has been found in 39 per cent of the cases. This includes those cases in which the systolic blood pressure was more than 160 mm. of mercury. It was the opinion of the internist that severe coronary sclerosis existed in 11 per cent of the cases. The electrocardiograms of six patients indicated the presence of bundle-branch block, and two patients gave definite histories of angina pectoris. All convalesced uneventfully.

Senile changes indicating cerebral arteriosclerosis were noted in the majority of a group of twenty-one patients who were aged more than seventy-five years. The oldest patient was aged eighty-seven years, and proved to be very difficult to treat because of his set opinions against the necessity of certain essential postoperative care. One can expect an occasional death among senile patients, but compared to prostatectomy, the rate will still be very low in experienced hands.

Various conditions, such as diabetes, Parkinson's disease, hepatic cirrhosis, asthma, and marked obesity or emaciation, might be considered as contributing to the risk. Patients with these disorders, however, seemed to withstand the operation without serious reaction; many who formerly had been denied operation, and who had been under the necessity of using a catheter for several years, were most grateful to be able to void freely again.

In preoperative care the first consideration is to establish free and complete urinary drainage. This is not important if patients have a small amount of residual urine, unless there is also marked infection. Renal function in such cases is usually good; hence,

I have not hesitated to proceed with the operation immediately in any case in which the value for urea was less than 40 mg. in each 100 cc. of blood, and in which residual urine measured less than 5 ounces (150 cc.), nd was free of infection, or only moderately infected. The old teaching that these patients demand a minimal period of drainage by catheter, I believe is wrong, and the last year's experience, to my mind, proves this. In the presence of marked infection or moderate renal injury, preliminary drainage by inlying catheter, accompanied by forced intake of fluids and induction of sweating by heat, are indicated. Not more than a third of the patients, however, will require any form of preliminary drainage, either by cystostomy or catheter. The other two-thirds not only do not need preliminary drainage, but will have a smoother course without the so-called vaccination, which I believe has been fallaciously held important. At The Mayo Clinic oral intake of fluid is supplemented by intravenous injection of saline solution, usually 1,500 cc. daliy, until a maximal renal output is established. In cases in which it appears that drainage will be demanded for more than ten days, suprapubic cystostomy is usually done. Of the 276 patients on whom transurethral resection was performed in 1932, forty-eight (17.3 per cent) were thus treated. It is well to ligate the ductus deferens to prevent epididymitis, since usually the patients who require suprapubic drainage are in such condition that every complication should be avoided. The presence of a suprapubic tube does not in any way make the transurethral operation more difficult. On the contrary, it is an added measure of safety, which, although it lengthens the postoperative course, does not lengthen it as much as the second stage in prostatic enucleation. Stimulation of the appetite by good food, and careful attention to regulation of movements of the bowels is necessary. Conversation with men who already have undergone the operation will bolster the morale of the timid patient who is contemplating submitting himself to it.

Experience at The Mayo Clinic in 1932 indicates there are very few cases of prostatic enlargement in which the transurethral operation is inapplicable. The only cases in which it is an impossibility are those in which the instrument cannot be passed. In such cases, and probably in a few others in which the glands are excessively large, the better treatment is prostatectomy. I have removed 45 gm. of tissue at one time and Bumpus, in two operations on one patient, has taken out 63 gm. It seems that few patients will have more than that much obstructing tissue.

Interest at present is centered on the other extreme; namely, the small gland.. Some urologists feel that early transurethral resection in such cases will ultimately be the ideal treatment. This I believe is unlikely, and certainly it is undesirable, for it may lead to promiscuous and dangerous surgery. At first thought, one might conclude that the smallest gland is the easiest and safest on which to operate.. True enough, there is little tissue to remove, but there is also a smaller margin of safety. In such a case the wall of the bladder has not hypertrophied, and there is no thickening of the trigone; hence, a deep incision might extend out into the perivesical or subtrigonal tissue, or possibly into the rectum. On the other hand, the patient who has had obstructive symptoms for months or years has a thickened vesical wall, and the trigone is hypertrophied and protected by underlying prostatic tissue; consequently, if resection extends more deeply than is intended, injury is not likely to result. The beginner in this work should select patients with moderate prostatic enlargement, who have had obstructive symptoms for some time; any surgeon must be extremely careful in operating on a small gland.

In anesthesia, the spinal method, using procaine, is preferred. The maximal dose should be 100 mg., whereas sometimes even as little as 50 mg., given between the third and fourth lumbar vertebrae, will suffice.

Trauma in passing the instrument must be carefully avoided. After the instrument has been passed, the operation should proceed rapidly. If the Braasch-Bumpus knife punch is used, coagulation with the needle electrode prior to incision will prevent bleeding from all but the largest vessels. It is possible, however, by working rapidly, to do the entire operation without this preliminary coagulation, for the instrument has direct vision, and the surgeon is not hindered by bleeding, as he is when he uses an instrument embodying a lens system. All tissue which projects intravesically should be removed, and special care should be taken to resect any tissue which is on the posterior vesical lip. With the knife punch, the surgeon should resect first the tissue which is nearest the bladder, and then that which lies toward the exterior, for it is easiest to engage the tissue in this fashion. It is perfectly safe, when the hypertrophy is moderate, to cut into the anterior half of the trigone, and if the surgeon visualizes the ureteral orifices and verumontanum, and resects between those

points, he will seldom have reason to worry. It should be the intention to remove all the obstructing tissue at one time; failing in this, an interval of at least ten days or two weeks should elapse before a second operation. Careful control of each spurting vessel usually will insure a smooth postoperative course. A urethral catheter, number 24 French, has proved most effective in providing postoperative drainage. Irrigation should be carried out every thirty minutes until venous oozing has stopped; following this, irrigation twice daily, until removal of the catheter at the end of forty-eight hours, is all that is necessary. In the large majority of cases there will be no trouble in voiding; catheterization six hours after removal of the retention catheter usually discloses no residual urine. If, however, more than 5 ounces (150 cc.) is retained in the bladder, and symptoms of obstruction persist, careful intermittent catheterization, or insertion of a retention catheter, will forestall the fever and toxemia which might otherwise result. I believe meticulous postoperative care, including prevention of the introduction of infection, has been chiefly responsible for the record, made at the Clinic, of 291 consecutive cases without a death.

The complication most to be feared is delayed postoperative bleeding occurring in the third week, when separation of the slough tears open new vessels. This happens in 5 per cent of the cases, in some of which evacuation of the clotted blood through a cystoscope will be required. Cystostomy in my opinion never should be required, and it was not done in 1932. Periurethritis occasionally will develop when one has forced a large instrument through a small urethra. Epididymitis has developed in an occasional instance in the second or third week after operation. Cystitis and pyelonephritis of a degree sufficient to weaken the patient, rarely has supervened. The total period of hospitalization of patients who constituted even the poorest risks has been considerably less than the average after prostatectomy, and in the large majority of cases has been less than a week.

SUMMARY

Transurethral prostatic resection is technically possible in any case in which the instrument can be passed. It is the operation of choice in any case of prostatic obstruction in which suprapubic prostatectomy would entail high risk. Because of the decreased morbidity and low mortality, patients who are in very poor general condition can be operated on safely. Many patients formerly condemned to drain their urine by catheter, or by permanent suprapubic stoma, can be relieved. Good results will be obtained in proportion to the experience of the surgeon.

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OBSERVATIONS ON PROSTATITIS.

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(Read before the Forty-second Annual Meeting of the Arizona State Medical Association, held at Tucson, April 20 to 22, 1933.)

Prostatitis is a disease almost as common as the ordinary "head cold," and probably as imperfectly understood and therapeutically neglected.

The structure known as the prostate gland lies behind the second portion of the rectum at the neck of the bladder, which it surrounds posteriorly and laterally. Quoting Lowsley from Oxford Urological Surgery, "By the earliest anatomists it was regarded as a urinary organ and even after its identification as a part of the generative system, its anatomy, histology and function were but imperfectly

understood and its pathological manifestations remained a vexatious problem to students of urology right up to our own time."

The main function of the prostate gland is to furnish a liquid medium clinically and physiologically suitable to the needs of the spermatozoa in their passage from the genital glands. Wallace sums up the evidence, classifying it as a generative instead of a urinary organ as follows:

1. It is confined to the male sex.
2. It enlarges rapidly at puberty along with the other generative organs.
3. It exhibits seasonal activity in animals such as the mole and hedgehog, which mate only at certain seasons of the year.
4. It fails to grow in individuals castrated in youth.
5. It atrophies in individuals castrated in adult life.

The adult prostate gland has an elaborate secretory structure, a muscular apparatus exhibiting sphincter action, and is extraordinarily rich in nerve fibers, ganglion cells and nerve end-organs (a fact which accounts for the bizarre symptoms of genito-urinary origin).

Our historical knowledge of the prostate dates back to Biblical times, it having been mentioned by Herophilus about 350 B.C. Nicola Massa, a Venetian physician living in the sixteenth century, generally is accredited with having discovered and described the prostate. Ambrose Pare, the renowned surgeon of the sixteenth century, originally a blacksmith and barber's apprentice, was the first to recognize that hypertrophy of the prostate was the cause of strangury.

Guyon, who has contributed so much to genito-urinary enlightenment, thought that prostate enlargement was a local manifestation of arteriosclerosis, but this theory was soon upset by the Austrian pathologist, Ciekanowski. Velpean and Billroth were the ones to advance the theory that prostatic enlargement is a fibroid change analogous to those changes in a fibroid uterus. Our present understanding of prostatic hypertrophy is largely the work of Tandler and Zukerkandl, published in 1912.

About 100 years ago (1838) Verdier gave an accurate description of the pathology of the prostatitis. Today it is well understood that bacterial invasion (gonococcus usually) of the prostate produces a process of congestion, infiltration, proliferation and fibrosis within this glandular structure.

In the early nineties, treatment of disease of the prostate by massage was first tried. Posner of Berlin in 1893 mentioned the cure of chronic prostatitis by repeated digital expression. Prior to the general acceptance of this therapeutic procedure, diseases of the prostate were treated by applications to the perineum in the form of counter-irritation, heat, cupping, leeches and the like.

In 1903, Young, Geraghty and Stevens published their comprehensive report on the pathology of posterior urethritis, prostatitis and vesiculitis. Thus we realize that our present knowledge of the prostate has come about slowly through the observation and experiment of many ancient and modern urologists.

In 1929, before the American Urological Association, I presented a plan for the classification of prostatitis which plan I find useful to follow in treating patients.

Prostatitis or infections of the prostate may be divided into two groups according to bacterial etiology—the specific, or gonorrheal, type; and the non-specific, or secondary, focal type.

The first or primary group, produced through gonorrheal infection, may be further classified according to pathology into three types: simple catarrhal or follicular prostatitis, true chronic parenchymatous prostatitis, and atrophic or atonic prostatitis.

Simple catarrhal or follicular prostatitis generally accompanies or follows an initial attack of gonorrheal urethritis in young men. In by far the majority of cases of gonorrheal urethritis, variously estimated from 70 to 95 per cent, the infection (bacterial invasion) spreads from the anterior to the posterior urethra by direct continuity or surface transmission (Pelouze). When a posterior urethritis is set up, it is always accompanied by some congestion or true inflammation of the prostate gland.

The severity of the pathological process varies from a simple congestion and swelling of the prostate gland by blood vessel engorgement and hypersecretion, to the formation of small follicular abscesses with or without plugging of the tubules by inflammatory debris. Coalescence of many small follicular abscesses with destruction of the stroma leads to the formation of a true "prostatic abscess."

The symptoms produced depend upon the amount of disturbance to physiological function in the urogenital parts. We are all familiar with the history of persistent urethral discharge, urinary discomfort, pelvic and rectal pains and the general toxic and nervous manifestations.

Primarily, catarrhal or follicular prostatitis is a local disease, and you might say, self limited under

conditions and circumstances favorable for cure. The factors favoring cure are physiological rest, free drainage from the prostate and the little-understood power of individuals to overcome infections through immunity processes.

The largest group of cases come under the second classification of true chronic parenchymatous prostatitis. Into this category may be placed patients who have had gonorrhea two or more times or who have had at any time a complication of epididymitis, seminal vesiculitis, abscess or stricture; and likewise a slow responding catarrhal prostate is an evidence of chronicity. In stricture cases, I have noted that the prostate usually is small, soft or fibrous, even atrophic and not inclined to undergo hypertrophy.

The gonococcus is not usually found in a chronically infected prostate, but on the other hand, a gonorrheal infection probably prepares the tissues for a continuation of the infection by other organisms. Lowsley, Young, Pelouze and others who have studied the bacteriology of chronic prostatitis most often have recovered from the prostate secretions the colon bacillus, staphylococcus albus, streptococcus pyogenes, pneumococci, diphtheroid and occasionally the gonococcus.

Chronic infections of the prostate involve not only the glandular secreting parts but the stroma as well. There is leukocytic infiltration, fibrous tissue formation, shrinkage and dilatation of the acini, distortion and compression of the ducts. Bladder-neck contracture and fibrous-bar formation, surgically prominent today due to development of the prostatic resectoscope, are none-the-less often the late results of chronic infection and fibrous infiltration of the prostate.

Such changes in the prostate and contiguous structures lead to the well known bizarre symptoms of urinary and genital origin.

In the treatment of true chronic parenchymatous prostatitis there is a wide field for work along the combined lines of physical, chemical and immunity therapy.

Atonic or atrophic conditions of the prostate and seminal vesicles should be considered as part of the general picture of acute and chronic prostatitis. However, as they form a rather distinct group of cases, mention should be made separately. These include cases of prostatorrhea, spermatorrhea and partial or complete impotency. These aberrations of function are partially the result of inflammation of the genital organs, but there are other causative factors, a discussion of which involves the field of neuro and psycho pathology.

Prostatorrhea and spermatorrhea, as the name suggests, is the involuntary loss of prostate and seminal vesicle fluid and is more a disturbance of physiological function than of changed histological structure. This condition occurs more commonly in young men who may or may not be venereally infected and as a rule is remedial.

The more serious condition of partial or complete impotency occurs more commonly in men past 40 years of age. Usually the primary etiological factor may be traced to post-gonorrheal pathology, neurosyphilis or continuous over-stimulation of the genital organs. The treatment of this important malady is preventative rather than curative. Careful periodic health examinations with early attention to any prostatic aberration, though slight and of apparently no significance to the casual observer, is suggested as one means of preventing later changes in the structure and function of the prostate. I might add here that, in cancer of the prostate, impotency is one of the early differentiating symptoms from adenomatous benign hypertrophy, in which cases there is over-stimulation of the genital function.

The secondary or focal type of prostatitis is a disease that has been brought to our attention by the development of the theory of focal infection. We are seeing an increased number of men who have definite prostatitis without any antecedent gonorrheal history. This is probably due to the fact that urologists and other diagnosticians are more alert these days to recognize the signs, symptoms and points of focal infection. Pelouze believes that the general focal infective triad in the male is teeth, tonsils and prostate. In eye conditions the facial sinuses also play a part. It is said that at least 35 per cent of all men beyond the age of 35 have, or will have, a prostatic infection. At least 72 per cent of all men with focal infective symptoms have an infected prostate. These prostatic infections cannot be permanently cured so long as their casual foci elsewhere in the body persist.

Particularly is the prostate subject to secondary infection if chronic passive congestion of the posterior urethral adnexa has been present. Following such debilitating diseases as influenza, pneumonia and septicemia, localization of the offending bacterium may persist in the prostate long after the patient has recovered from the main disease. Especially is this true if there has been any stasis of urine in

the bladder necessitating a few catheterizations during the acute illness.

Chronic colitis with constipation, rectal fistulae and hemorrhoids may lead to passive congestion and infection of the prostate, usually by the Bacillus coli, carried through the lymphatics of the pelvis.

In searching about for the cause or contributory factors in arthritis, neuralgia, sciatica, opthalmitis and sterility, one should always consider the infected prostate.

A surprising point about secondary focal prostatitis is the frequent absence of characteristic genito-urinary symptoms calling the physician's attention to this organ. However, as some medical philosopher has said, each disease hangs out its own little flag, which, if seen and understood, points to the diagnosis. That is true of the infected prostate—sooner or later there will be some local or remote sign or symptom suggesting prostatitis.

This type of prostate, harboring focal infection, may be normal to the examining finger, but when the secretions are expressed by massage, studied culturally and microscopically, will be found to contain pus cells in clumps, bacteria and inflammatory debris. It is often necessary to repeat the examination several times at intervals of three to five days and to use the provocative test of posterior urethral dilatation and instillation of one-half to one per cent silver-nitrate solution in order to express latent foci from the plugged-up tubules of the prostate.

Tuberculosis of the prostate should be added to the secondary focal type of infection, as only rarely is it primary. As you know, genito-urinary tuberculosis is wont to localize first either in the kidney or the epididymis, with the prostate standing between, subject to infectious drainage from either of these points.

In conclusion, success in the treatment of prostatitis and related disease depends primarily upon the recognition of type, degree and stage of infection or disturbed function. Without going into a detailed discussion, it may be said that the principle of treatment, as we now understand the mechanism of cure, is to promote free drainage of infectious material from the prostate through physical measures—massage, heat, rest; correction of any urethral, bladder or adnexal pathology, eradication of related infected foci, stimulation of tissue reaction by means of drugs, and, lastly, activation of the body immunity processes.

BELATED SERUM TREATMENT OF SEQUELAE OF DIPHTHERIA.

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(Read before the Forty-second Annual Meeting of the Arizona State Medical Association, held at Tucson, April 20-22, 1933.)

Paralysis is a common sequel in diphtheria. It may follow the mildest diphtheritic infection. It occurs in unrecognized cases of diphtheria. In 1927, Litvak[1] was surprised to learn how little had been written on this subject in the English language and how few cases had been reported in detail. He reports an incidence of diphtheritic paralysis, in a hospital for contagious diseases, of 10 per cent of all diphtheria patients.

Garvey[2] states, "Landouzy goes so far as to say that the number of cases (of post-diphtheritic paralysis) exceeds all other forms of paralysis combined. He thinks also that 10 to 20 per cent of all diphtheria patients have some form of paralysis following diphtheria."

Raymond[3] reports that 18 per cent of soldiers in one French regiment developed paralysis after diphtheria.

"More cases of diphtheritic paralysis are being observed in spite of widespread use of antitoxin. There is little relationship between the resulting paralysis and the amount of antitoxin given, but more between the time treatment is instigated. No doubt the antitoxin treatment is responsible for many cases being carried through the acute diphtheritic stage, which subsequently develop paralysis, that without antitoxin would have been fatal."[4]

SYMPTOMATOLOGY

The cardiac nerves, usually the pneumogastric, and the cardiac muscles, are affected very early. Cardiac paralysis is the one most to be feared. It may occur as early as the fourth or fifth day, but most frequently comes during convalescence.

The most common paralysis, and the earliest of all except cardiac, is paralysis of the palate, with loss of pharyngeal reflexes. This is evidenced by loss of function, nasal twang to voice, difficulty in swallowing, particularly liquid food, which escapes through the nose. Frequently, deglutition is accompanied by short coughs; later, feeding may become a problem; mucus accumulates in the throat, aspira-

tion pneumonia being one of the most dreaded complications in this condition.

Paralysis of the larynx and vocal cords is another variety which offers a grave prognosis. Breathing becomes stertorous, dyspnea and stridor supervene. Paralysis of the muscles of respiration is usually seen in generalized paralysis. Paralysis of the diaphragm usually occurs. It may be unilateral or bilateral. In the latter condition the prognosis is grave.[1]

DIAGNOSIS

This is not usually difficult, except when lacking a history of throat infection, but must be carefully worked out against poliomyelitis, juvenile tabes dorsalis, and laryngeal diphtheria. The Schick reaction is not of service, for Laverne and Zoller[4] show that it is impossible to base a retrospective diagnosis on the findings of the Schick diphtheria test, as it may be negative even with pronounced diphtheritic paralysis.

PROGNOSIS

Prognosis in post-diphtheritic paralysis is usually hopeful and is not necessarily dependent on the extent of involvement. However, even the mild cases may linger on for many months or even years, and are of course exposed to complicating accidents. Some will succumb to myocarditis after the paralysis has subsided. The paralysis of the velum is a good criterion of the state of the paralysis. When the fluids in the mouth cease to run out of the nose, the paralysis may be regarded as practically conquered.[5] The disappearance of the nasal twang of the voice is also favorable.

PROPHYLAXIS AND TREATMENT

The mainstay in the treatment of post-diphtheritic paralysis is its anticipation by absolute rest in bed.[1] This should apply in all cases of suspected diphtheria because of the heavy percentage of paralytic complications occurring in convalescence. When paralysis is established, the treatment consists of rest in bed, tube feeding when necessary, strychnine in 1/15 grain doses, other cardiac stimulants when necessary, and avoidance of any exertion for many months. There is practically no mention of specific treatment by English or American authors, but some French and Spanish writers recommend the use of antitoxin, even very late. S. Madrid Paez, Buenos Aires, in 1926 reported fourteen cases treated successfully by antitoxin in 5,000 to 10,000 unit doses. One German authority recommends specifically against the employment of antitoxin as being valueless.

In the month of December, 1924, Senora Y., of Guaymas, Sonora, Mexico, visited her old home in Chihuahua with all of her family except two boys, in whom we are particularly interested, and who remained in Guaymas. While she was in Chihuahua, two of her sisters were in bed for four days each, on account of sore throats with spots or membranes. As their father had been a doctor, they treated themselves, as often happens in doctors' families.

One of these sisters who had suffered sore throat returned to Guaymas with Senora Y. and her family. About the end of January, Senora Y. herself became sick with sore throat and fever for four days. As soon as she was up, her two oldest boys, who had not accompanied her to Chihuahua, fell sick with the same ailment. The younger, Luis, ten years, was sick for only three days, but the elder, Jorge, age twelve years, after staying in bed for four days, got up for two or three days and again went to bed with high fever. This was about February 1, 1925. During his short escape from bed, Jorge infected a boy neighbor; a young lady who was a frequent visitor at the house, also developed a sore throat with fever.

Although the later cases were seen by doctors, no diagnosis of diphtheria was made, no specific treatment was given, and except for the boys, Jorge and Luis, all patients made perfect recoveries.

About February 15th, at least two weeks after Jorge's so-called relapse, Doctor F. Mendoza was called in consultation for Jorge, on account of persistent vomiting. After examination he diagnosed acute nephritis following tonsillitis. Under dietetic treatment, there was relief from vomiting and improvement of the nephritis. A few days later, Doctor Mendoza took charge of the case, due to illness of the attending physician. He now recognized, in addition to the nephritis, myocarditis, paralysis of some of the muscles of respiration and probably of the diaphragm, paralysis of the ciliary muscles (so that letters of less than one inch were not recognized), and paralysis almost complete of the muscles of voice and deglutition. It was possible to feed the boy only in a semi-recumbent position, by liquids, through a tube directed into the esophagus. He diagnosed these complications as direct results of diphtheria.

Doctor Mendoza called me in consultation, March 20th. I corroborated his findings, and even at this date, not less than forty days after the subsidence of his acute symptoms, I recommended the use of antitoxin. My colleague was more than reluctant to acceed to this. He had consulted a number of authorities and, of the few that mentioned use of antitoxin

in late paralysis, all were distinctly adverse. Among other authorities he quoted to me a Spanish translation of a recent German work on Medicine, Krause and Carre, section of Serotherapy, contributed by G. Jochman, in which the opinion was specifically adverse to the use of antitoxin, stating that, after a long period of fixation of the toxin in the cells, the damage was irremediable, and quoting an authoritative comparison of Sahli, that "'water can extinguish fire, but water cannot reproduce what fire has destroyed."

The family also were quite reluctant to institute any treatment which might inconvenience the child, as they had quite lost hope of saving him.

Our library facilities were exceedingly meager, but, after a painstaking search of medical journal files, I was able to quote a half-dozen abstracts, mostly from French and Spanish literature, where favorable results in diphtheritic paralysis had been obtained six and nine months and even, in one case, as late as four years, by the belated use of antitoxin.

As our case was really a desperate one, I continued to urge an experiment with the serum. Fortunately enough, in the continued discussion, during which we thoroughly reviewed the history, Doctor Mendoza mentioned that the younger brother, Luis, who had been stricken about the same time, had completely recovered, except that he had a lingering disability of the pharynx which prevented him from enunciating such words as "tercer regimiento de artilleria." I then insisted upon experimental treatment of this youngster as a control case. The treatment was reluctantly begun on March 22nd—1000 units after a test of susceptibility. On the next three days he received 3000, 5000 and 10,000 (19,000 in all) and then refused to take any more. No sign of improvement was noted until the eighth day after the first injection (March 31st) but then, in three days all signs of his slight disability had disappeared and he was easily able to pronounce the words which had previously been impossible.

Doctor Mendoza was so delighted with this result that on the same day, April 3rd, approximately fifty days after the diphtheric inflammation, he began to inject serum into Jorge, the desperately ill boy, beginning with 5000 units, followed by 10,000 and 10,000 and 6000, making 31,000 in all. In the meantime, Jorge had become progressively weaker and had developed a new and interesting symptom, a convergent strabismus. No improvement whatever was noted for eight days, until April 10th, after which date progress was rapid and continuous. About May 15th, one month later, the boy was brought to me at Empalme, walking from and to the automobile in which he came. He was naturally weak, with persisting evidence of cardiac and renal weakness, but had recovered full voice, vision, deglutition and respiration. Now, after the lapse of eight years, he is a tall young man in perfect health.

There was a third case in this little epidemic, of a small boy with throat symptoms, in a family too poor to buy serum. Two weeks after apparent recovery, he developed paralysis of the palate and of both legs. Twenty thousand units of antitoxin produced complete recovery in the third week.

OBSERVATIONS

These cases are of interest because:

1. Three cases of paralysis developed in an epidemic of relatively few cases, so mild in symptomatology as to escape diagnosis of diphtheria.
2. None had original antitoxic treatment.
3. Relatively late specific treatment with antitoxin produced gratifyingly rapid and complete cure of three cases of paralysis.
4. My inference, from these cases, and from the literature I have been able to study, is, that antitoxin is often given in inadequate quantities and for an inadequate period, and that, on the development of paralysis, antitoxin should again be administered, with proper safeguard against sensitization.

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DISCUSSION

DR. W. R. LYON (Tucson): When, during 1894, the first supply of Behring's antitoxin, the new cure for diphtheria, was received in Philadelphia from Germany, it was my good fortune to be selected to assist in an investigation or study of its use in the treatment of that disease. Shortly after my graduation from medical college there was an epidemic of diphtheria in the community where I was practising.

At that time few physicians were familiar with the use of antitoxin and most of those who ventured its use feared to administer more than 500 to 1000 units, and then condemned it for causing postdiphtheritic paralysis and death from "heart failure."

Because of my experience with its first use in Philadelphia, and having all confidence, I was giving doses of 5000 to 20,000 units, repeated as indi-

cated, and securing recovery in the most severe cases, without subsequent paralysis or any ill results. There were numerous cases of paralysis among patients having had mild attacks of diphtheria and those who had recovered only because of the use of even 500 to 1000 units of antitoxin. I had the privilege of treating several of these cases with antitoxin and the treatment was followed by prompt recovery from paralysis in every case. Although medical articles have been published frequently denying the value of anti-diphtheritic serum in the treatment of post-diphtheritic paralysis, my early and continued experience has convinced me that its use does often give favorable and prompt results. On the strength of my own experience I wish to corroborate the statements just made by Dr. Houle.

DR. KENNEDY: What susceptibility tests were made on paralysis cases (Schick test?) and how long did they remain positive? I know of no publication which gives information about what the Schick test shows following an attack of diphtheria or subsequent paralysis.

DR. JAMES S. BOYER (Tucson): I have been in the practice of medicine over fifty years. In the early part of my professional life there was no antitoxin to combat the terrible disease diphtheria. I have not heard anything said in this excellent paper or the discussions of it about there being any such sequelae as was commonly called in those days "limberneck." It was a paralysis of the muscles of the neck and so severe that the patient could not hold up or move the head in any direction and there was no control of these muscles. The few cases that I have seen all recovered within a few months, with tonics and supportive treatment. Not a few physicians and others were of the opinion that this paralysis was due to the use of the diphtheria antitoxin until, later on, it was found that the antitoxin prevented it almost completely.

I wish to emphasize especially that usually antitoxin is not given in sufficient doses to secure the best results. I have given twenty, thirty, forty, sixty, and eighty thousand diphtheria antitoxin units to small children and adults with the very best results even in desperate cases. There is another phase in the sequelae of an attack of diphtheria that must not be overlooked, and that is, it occurs frequently that an apparently mild attack is followed by the severest paralysis. I recall clearly the case of a lady thirty years of age, married and the mother of two children, one about three years of age and the other a nursling at the breast. She was brought to me some distance from the city where I practised, for treatment. She had paralysis of the muscles of deglutition and had not taken any food by mouth for about six days. She complained of being very hungry. She looked well—had no fever and had had none at any time. There was no history of sore throat or cold but, on careful inquiry, it was brought out in the history of the case that the older child had a very little cold about two weeks previous to the mother's illness. After a thorough examination of all the facts and of the patient, I concluded that the mother's paralysis was from diphtheria, which proved correct. I gave her strychnia, quinine, and iron, in large doses, three times a day, and she promptly recovered. I did not give her diphtheria antitoxin as some would do for her paralysis.

DR. HOULE (closing): I am asked whether these cases respond to the Schick test. As to the cases reported, I cannot say, for the test was not then available to us. Laverne and Zoeller of Paris state that it is impossible to base a retrospective diagnosis on the findings of the Schick diphtheria test, as it may be negative even with pronounced diphtheria paralysis.

I report these few cases, solely because of the great scarcity of literature on the subject. I am more than pleased with the general discussion—and particularly with the corroborative statements which were made.

POLIO-BULBAR-ENCHEPHALITIS.

(CASE REPORT)

HARRY LEIGH, M. D.
El Paso, Texas

(Reported at the Staff Meeting of El Paso Masonic Hospital, El Paso, Texas, April 20, 1933.)

The child is two years old, female, white.

Family History: Her father and mother are living and in good health. The family history is negative for cancer or tuberculosis.

Patient was first seen at the Cloudcroft Baby Sanatorium, Cloudcroft, New Mexico, on July 25, 1932, with an admitting diagnosis of gastro-enteritis. At time of admittance in the Sanatorium she had been ill one week, beginning with temperature, vomiting, and prostration for the following four or five days. Treatment had been mainly catharsis and starvation. The baby had begun to refuse all food and liquids. Intraperitoneal saline had been given and baby was ordered from its home to the mountains.

When first examined, at the Sanatorium, the baby was very pale, weak, and appeared very ill, with a temperature of 102°; respirations were shallow and asymmetrical, with 48 excursions per minute. Detailed examinations revealed bilateral ptosis of upper lids, bilateral facial paralysis, slight bilateral nystagmus, and palatal paralysis, dry tongue, and inability to swallow. There was a marked Brudzinski, and upper dorsal and lumbar resistance to flexion. Right intercostal movement was limited. On abdomen the tache was strongly positive. Right arm had flaccid paralysis contrasting to spastic lower extremities and to the left arm. Deep reflexes were diminished. Both Babinskis strongly positive. Kernig positive. Due to the low

vital state, these findings were not easily confirmed until after twenty-four hours of intensive hydration and food. Tube feeding resulted in rapid improvement and a return of strength. The spinal fluid was under marked pressure but negative to cell increase; globulin, a trace; sugar reduction, normal; and spinal Wassermann was negative.

Repeated punctures were about the same for the next ten days. The general condition of the infant improved, along with some returning motor function in the right arm and chest muscles. An erratic temperature ran consistently high, without disturbance to the digestion. In one week the baby came to Masonic Hospital. Tube feeding was necessary for several days more. Gradual improvement of the swallowing function enabled her to take water and small amounts of milk at first. She soon was able to turn, elevate the right arm, lift the head, and to chew toast. The ptosis left, but the masklike appearance of the face has continued to some extent. Blood studies showed considerable anemia. Persistent, however, was the mental fogginess and temperature, for almost four weeks, when the former condition rapidly improved. The daily fever lasted until six weeks later, with excursions going up to 103° for short intervals. At no time was the digestion disturbed by the febrile reactions. Consequently, it was thought that most likely some cerebral edema was disturbing the heat mechanism.

Since poliomyelitis rarely occurs as a pure type, I am inclined to class this case as essentially a poliobulbar-encephalitis with some spinal involvement. In this type the spinal fluid is usually negative except for pressure and volume increase. These phenomena are consistently found in this variety of poliomyelitis. Less than 4 per cent of the cases seen in New York last year were of this type..

This child was last seen at the office, about the middle of September, when she was quite normal, walking, talking, and so forth; but she seemed a little weak. The face alone appeared to have failed to recover its full function, and the trace of the mask was quite noticeable; i.e.—the normal creases and folds of the skin still failed to develop properly while smiling, eating, and so on.

GRANULOPENIA: Report of Case Following Injection of Gold and Sodium Thiosulphate.

E. W. RHEINHEIMER, M. D.,
LESLIE M. SMITH, M. D.
El Paso, Texas.

Granulopenia, the subject of numerous reports in the literature, has been divided by Piersol and Steinfield[1] into: (1) primary granulopenia, which may be either (a) acute or (b) chronic or recurrent; and (2) secondary granulopenia. Secondary granulopenia may be due to infections, radiation, sepsis, certain blood diseases, or chemical poisons.

Benzol is known to cause granulopenia, and this action is taken advantage of in the treatment of myelogenous leukemia. Occasionally the toxic effect of arsenic is manifested by a similar blood picture. McCarthy and Wilson[2] have summarized the cases of blood dyscrasias reported following the use of drugs of the arsphenamine series. Twelve of these cases were classified in the granulopenic group, and four of them terminated fatally.

Toxic reactions due to gold are not rare.[3] The symptoms may appear immediately in the form of flushing and edema of the face, nausea and vomiting, tachycardia and perspiration. In mild cases there may be only a slight febrile reaction, with malaise and headache. Occasionally, a metallic taste is noticed. Among the features of the delayed reactions, which begin several hours after injection of the drug, are fever, headache, nausea, vomiting, prostration, nephritis, hepatitis, stomatitis, gingivitis, and hemorrhagic enteritis. The skin manifestations may be erythematous, scarlatiniform, papular, vesicular, bullous, or hemorrhagic. A general exfoliative dermatitis, comparable to that following arsphenamine, may occur.

Although the acute disseminated form of lupus erythematosus, which occasionally follows the use of gold and sodium thiosulphate for the more indolent form of the disease, is known to be accompanied by leukopenia,[4] we have been unable to find any report in the literature of granulopenia following the administration of any preparation of gold.

We report here a case of granulopenia, the symptoms of which developed suddenly a few hours after a second injection of gold and sodium thiosulphate which was used in the treatment of a chronic discoid lupus erythematosus. There is no positive proof that the gold was responsible for the condition, but the history is most suggestive of a causal relationship. We feel that the possibility of this serious and heretofore unreported reaction to gold therapy justifies the publication of this case.

CASE REPORT

Mrs. M. M., aged 58, white American housewife, was first seen on January 23, 1933, at which time she complained of "red spots on the face," which she had noticed for six months.

The family history was negative except that her mother had died of tuberculosis.

The patient had diphtheria at the age of ten, and frequent attacks of sore throat since, until the past ten years, when she had been free of this trouble.

Her past health had been generally good, although she was never robust.

Examination: Well developed and nourished woman apparently in good health. There were three definite oval discs on the face which were of a violaceous hue. The hair follicles in the lesions were dilated and filled with hyperkeratotic plugs. Tonsils were small, but with adherent pillars. There was impaired resonance from the right apex to the second rib, with bronchovesicular breath sounds and few scattered crepitant rales exaggerated by coughing. Although there was a negative personal history, this was diagnosed clinically as fibroid tuberculosis. The remainder of the physical examination was negative.

The urine was normal. Blood picture: R.B.C. 4,500,000; W.B.C. 8,000; neutrophiles 72 per cent, small lymphocytes 24 per cent, large lymphocytes 3 per cent, eosinophiles 1 per cent, Hb. 90.

On January 30, 1933, the patient was given 40 mg. gold and sodium thiosulphate intravenously. This was well tolerated. On February 6, a second injection of similar dosage was given. Shortly thereafter she ate ice cream, in spite of advice to partake of no food for several hours. An hour later she became nauseated and vomited. During the same night she had a chill lasting two hours and followed by high temperature. The following day a generalized erythematous rash appeared, accompanied by slight swelling of the hands and feet but no pain. She was thought to have a gold reaction, and was given sodium thiosulphate intravenously. This was repeated after two days. By February 11 the rash had faded and the temperature was normal. Early on the morning of February 12, she had a severe chill followed by high fever and profuse sweating. A deep erythematous rash appeared over the entire body. The hands, feet, and face became swollen. At this time the temperature was 104°, pulse 104, respiration 18; R.B.C. 4,500,000, W.B.C. 3500, neutrophiles 32 per cent, small lymphocytes 58 per cent, large lymphocytes 10, nuclear index 3.

The following day the patient was extremely weak and complained of severe pains in all the joints. The tongue, oral cavity, and pharynx were deeply congested. The gums, inner surfaces of the cheeks, uvula, and anterior pillars were covered with patchy, curdled milk-like flakes resembling thrush. The temperature remained high. On this day injections twice daily of 10 cc. of nucleotide K96 were started.

Feb. 14, 1933. The white count had dropped to 2,000. Neutrophiles 34 per cent, small lymphocytes 60 per cent, large lymphocytes 6 per cent, nuclear index 3.4.

Feb. 16. W.B.C. 1,000; neutrophiles 24 per cent, small lymphocytes 56 per cent, large lymphocytes 18 per cent, eosinophiles 2 per cent, nuclear index 2.4. During this period the patient remained prostrated with joint pains and high temperature.

By Feb. 18, the patient began to show improvement. W.B.C. 2900; neutrophiles 18 per cent, small lymphocytes 76 per cent, large lymphocytes 4 per cent, eosinophiles 1 per cent, basophiles 1 per cent.

Feb. 20. W.B.C. 3,000; neutrophiles 50 per cent, small lymphocytes 48 per cent, large lymphocytes 2 per cent, nuclear index 8.

Feb. 24. W.B.C. 7500; neutrophiles 60 per cent, large lymphocytes 1 per cent, small lymphocytes 38 per cent, eosinophiles 1 per cent, nuclear index 9. The oral cavity and nostrils were practically normal.

Feb. 27. W.B.C. 8400; neutrophiles 68 per cent, small lymphocytes 28 per cent, large lymphocytes 2 per cent, eosinophiles 2 per cent.

March 2, 1933. W.B.C. 8,000; neutrophiles 69 per cent, small lymphocytes 20 per cent, large lymphocytes 7 per cent, eosinophiles 1 per cent, basophiles 1 per cent.

March 18. W.B.C. 8400; neutrophiles 70 per cent, small lymphocytes 24 per cent, large lymphocytes 3 per cent, eosinophiles 2 per cent, basophiles 1 per cent. Recovery henceforth was uneventful, and the patient has remained well to the present time (April 24, 1933). During the course of the illness the urine, blood culture, and Wassermann were negative.

COMMENTS

At first thought this case might appear to be a disseminated lupus erythematosus. However, the typical blood picture and the marked response to nucleotide therapy classify it as granulopenia. The patient received a total of 16 intramuscular injections of nucleotide K96. Following the seventh injection, there was a moderate reaction, with nausea, vomiting, and dyspnea. This was controlled by atropine. Subsequent injections were preceded by the administration of atropine, and there were no further reactions.

SUMMARY

A case of granulopenia is reported which followed closely after a second injection of gold and sodium thiosulphate for chronic lupus erythematosus. No other reports have been found of this type of reaction to gold therapy. The condition responded to injections of nucleotide K96.

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PUBLIC HEALTH NOTES

J. ROSSLYN EARP, DR. P. H.
Director New Mexico State Bureau of Public Health

A SOCIAL ASPECT OF TONSILLECTOMY

In the present volume of Southwestern Medicine on page 106, I reported the judgment of some English research workers that diphtheria bacilli in the nose live "a saprophytic existence on the pathological mucus and pus." The same workers concluded that throat carriers of diphtheria bacilli are regularly cured by removal of the tonsils. May this not be the case because the bacilli also live a saprophytic existence in the mucus and pus to be found in the crypts of tonsils?

Such a theory is supported by a recent experience of the health officer of Santa Fe County. Twenty-six children in a Santa Fe school had been exposed to an ambulant case of diphtheria. In taking swabs from these children, Doctor McIntyre observed three whose tonsils were in so obviously diseased a condition that he made a note of their names for follow-up work by the school nurse. When the reports came back from the state laboratory, three out of the twenty-six children were positive carriers. Doctor McIntyre was interested to note that the names on the three positive reports were the same three names which he had noted down for follow-up work.

It would seem that a diseased tonsil is not only a menace to its owner but makes him a potential danger to all his friends.

THE BRUSH FOUNDATION

The most instructive interview I had during a recent trip to the East was with Dr. T. Wingate Todd, professor of Anatomy at Western Reserve and director of the Brush Foundation. From a broad foundation of physical anthropology and comparative anatomy, Doctor Todd and his associates have developed new technics for the study of growth which are of the greatest significance. There is no space to describe them here but I would urge all my readers who are interested in pediatrics or in the problems of adolescence to keep a very close watch over the publications of the Brush Foundation.

Incidentally, the x-rays figure very prominently in the early diagnosis of growth defects (faulty nutrition), just as they do in early diagnosis of tuberculosis. Before clinical symptoms occur to which a physician's attention may be directed, the parent observes personality changes such as irritability and lack of muscular coordination. But Doctor Todd can forecast even this stage by his studies of x-ray pictures of the short bones of the hand.

He believes adequate calcium intake to be very important, but, if I understood him properly, he considers an adequate supply of vitamins A and B to be more important still. Even a normally adequate calcium diet may become inadequate if the absorptive surfaces are damaged through vitamin deficiency.

ALLERGY

The following story is told by Dr. Anson B. Ingels of Grant, New Mexico. His letter is dated April 1, but we feel sure he would not take advantage of the date:

"A family of three adults—one being a boarder and not of the immediate family—and three children of 13, 11, and 4, respectively, wherein the father and mother and the child of 13 are positive pulmonary tuberculars, ate beef from a freshly killed animal that was suspected of being tubercular and the positive tuberculars in the family reacted first with an urticarial rash and later with skin spots suggestive of an old tuberculin reaction, which persisted for about three days after they had stopped eating the suspected beef.

"There was no reaction of any character in the adult boarder (a non-tubercular) nor the two younger children who give a negative tuberculin reaction."

I am not sure whether this observation should be used to develop a test for dead cattle or an enteral alternative to the tuberculin test in man. But it is certainly of interest.

THE MEDICAL CLINICS OF NORTH AMERICA. (Issued serially, one number every other month) Volume 16, No. 6. (Mayo Clinic Number—May, 1933). INDEX NUMBER. Octavo of 239 pages with 28 illustrations. Per Clinic year,, July 1932 to May 1933. Paper, $12.00; Cloth, $16.00 net. Philadelphia and London: W. B. Saunders Company, 1933.

This is the ever popular Mayo Clinic Number of the Medical Clinics, with its wide range of interesting subjects. Among those which the reviewer found especially interesting and timely were the articles on diabetic acidosis and coma; colitis and so-called colitis; indican in the blood as a test of renal function; mediastinitis; peptic ulcer syndrome without ulcer; foreign bodies in air and food passages.

W. W. W.

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COMING EVENTS CAST THEIR SHADOWS.

Under the heading "'Balancing the Budget by Increasing the Saloons" the Paris (France) correspondent of the Journal of the American Medical Association writes as follows in the July 8th issue of that magazine:

"The draft of the national budget as presented to parliament contains an item that has aroused the indignation of all hygienists. Some means must be found to balance the national budget, which shows a deficit of 3,000,000,000 francs ($144,000,000). The members of the chamber of deputies have not the courage to reduce expenses by lowering the salaries of countless clerks and petty officials; by the reduction of pensions, which have reached an enormous height; by eliminating the waste represented by social insurance—all of them expenditures that were launched during the period of prosperity and from which the beneficiaries will not permit reductions. It appears that the sole interest of the deputy is the promotion of his reelection, even though that is accomplished at the expense of the general welfare. Already the appropriation granted to the ministry of public health has been greatly reduced. But a more serious menace threatens the public health. In order to provide new revenues, the government has suggested measures designed to increase the annual income without raising too strong protests. One measure proposed is the licensing of 2,000 new places for the dispensing of alcoholic beverages. The number of such places in France is already large. To this and to the scandalous privilege enjoyed by grape growers of retaining every year, for their own use and without payment of dues, 'twenty liters of alcohol,' is due the maintenance of alcoholism in France in excess of any other European nation. Sweden and Switzerland, which formerly headed the nations consuming alcoholic beverages, have rapidly dropped below France by simply restricting the number of cabarets. This was brought about in Sweden by the introduction of the famous Gothenburg system. It has never been possible to effect the adoption of the system in France by reason of the tyrannical influence on the members of parliament of the powerful syndicates controlling the sale of alcoholic beverages. In some villages in the North one finds a place for dispensing alcoholic beverages for every five houses. In the new budget, which provides for 2,000 new dispensing places, the government plans to increase its revenue by about 2,000,000 francs (about $100,00). But the hygienists say that the increase in places dispensing alcohol will increase the number of persons affected with diseases of the liver, kidneys and brain, and also the number of degenerate and tuberculous children for whom the state would have to care in the hospitals, asylums and sanatoriums, at an expense twenty times greater than the additional income the government hopes to secure. In the senate, Justin Godart, formerly minister of public health, vigorously protested against the proposal, presenting arguments in the interest of the public health. He showed that all nations are fighting alcoholism and that France, the country most affected by this type of degeneration, is taking action which will make present conditions worse. The senate and the chamber of deputies nevertheless adopted the plan. The protests of the hygienists and of the Federation des syndicats medicaux du departement de la Seine could be presented only in the medical journals and in the large reviews. The daily press, being more or less in league with the dealers, owing to important advertising contracts, did not take notice of the event."

In the present temper of the American politico-economist, he will learn no lesson from this.. That temper is probably best illustrated by the attitude of the national leaders toward science in general, as shown by their drastic reductions in all governmental agencies dealing with scientific research or study. These drastic reductions in the appropriations for the Bureau of Standards, the U. S. Public Health Service, and other governmental departments dealing with applications of scientific discoveries, as compared with the enormous appropriations for other purposes, are very significant. The appropriations which have been made for scientific departments are mainly for buildings, aiming to give employment to laborers, while throwing out of employment thousands of chemists, physicists, geologists, physicians, and research workers in various lines. The exaltation of brawn at the expense of brains is an attitude of the present national government which should give all scientists cause to think.

HARRY T. SOUTHWORTH

The sudden death of Dr. Harry Thomas Southworth, of Prescott, Ariz., will be mourned throughout the southwest. Always a staunch supporter of the highest ideals of medicine, and an active worker in medical organizations, he was among the leaders of his profession in Arizona. Death occurred during the night of July 16, from some cardiac lesion.

He was still in the prime of life at the age of 57, having been born in Ohio in 1876. He graduated from the Chicago Medical College in 1901, and located in Prescott in 1903, where he practiced continuously until his death, except for two years' service as major in the army medical corps during the World War.

Dr. Southworth had served in almost every place of trust and responsibility in medical organizations in Arizona, including presidency of the Arizona State Medical Association in 1923. The following resolutions by The Yavapai County Medical Society express the sentiment of the profession of the state and the entire southwest:

WHEREAS: God in his inscrutable wisdom has seen fit to call to a higher sphere of usefulness, Doctor Harry Thomas Southworth of Prescott, Arizona, and

WHEREAS: He was a charter member and former president of this Society; a member and former president of the Arizona State Medical Association; for many years City Health Officer of Prescott and a charter member and former president of the Arizona Public Health Association; a Fellow of the American Medical Association; a Fellow of the American College of Surgeons, and

WHEREAS: He was a skillful surgeon and capable physician, and

WHEREAS: By his kindly nature, courtly manners, strict integrity, and high professional attainments, he has won the admiration, respect and friendship of his professional confreres throughout the whole state, and

WHEREAS, His winning manner, sterling character and unfailing kindness have won to him a host of friends in all parts of the state,

THEREFORE, BE IT RESOLVED: That in the death of Doctor Southworth this Society has lost an active and useful member, the medical profession a gentlemanly, scholarly and successful physician, and the state a loyal, public-spirited citizen,

AND, BE IT FURTHER RESOLVED: That the secretary be instructed to spread these resolutions on the minutes of this Society, and a copy be sent to the relatives of the deceased and copies furnished the daily press, Southwestern Medicine and the Journal of the American Medical Association.

ROBERT W. CRAIG

The death of Doctor Robert W. Craig, of Phoenix, Ariz., removed from the scene one of the colorful figures in the practice of medicine in that state. He was born in 1871, graduated from Rush Medical College in 1895, and after serving as assistant to Dr. John B. Murphy of Chicago for a year or two, located in Phoenix about 1898. During thirty years' practice in Phoenix, Dr. Craig amassed considerable property, and retired from active professional work about four years ago. He resumed practice several months before his death. At different times he had associated with him in practice some of the prominent men still practicing in Phoenix, including Drs. Louis Dysart, Kimball Bannister and S. I. Bloomhardt. Dr. Bloomhardt was married to Dr. Craig's only daughter several years ago.

He was taken suddenly ill at his mountain home near Payson, was brought to Phoenix by airplane, and died after several days with acute nephritis. Death occurred on July 12th.

IGNATZ D. LOEWY

Dr. Ignatz D. Loewy, of the United States Veterans' Hospital at Whipple, Ariz., died in that institution on April 10th, of tuberculosis of the lungs and tumor of the brain. Dr. Loewy was 53 years old, graduated from Jefferson Medical College in 1903, and had been on the staff of the Veterans' Hospital at Whipple for several years. He was a frequent visitor and contributor to the Association meetings in Arizona and affiliated as an honorary member with the Yavapai County Medical Society.

JOHN D. MAULDIN

Dr. John D. Mauldin, formerly located in Phoenix, Ariz., and one time County Health Officer of Maricopa County, died in Gainesville, Ga., on June 6th of cardiorenal vascular disease. He was a graduate of the University of Georgia Medical Department in 1901, served in the medical corps during the World War. He was a member of the Maricopa County Medical Society and the Arizona State Medical Association. He moved from Phoenix about a year ago, returning to his home in Georgia.

EUGENE M. FISHER
(Roswell, N. M.)

Through oversight, we have failed to record the death of Dr. Eugene M. Fisher, of Roswell, N. M., which occurred on January 28th, of acute nephritis. Dr. Fisher was 58 years old at the time of his death, graduate of the Fort Worth School of Medicine, class of 1898. He had practiced in Roswell since 1903, was a member of the Chaves County Medical Society, the New Mexico State Medical Society and a Fellow of the American Medical Association.

ALFRED H. VOGT
(Albuquerque, N. M.)

Dr. Alfred Herbert Vogt, of Albuquerque, N. M., a member of the Bernalillo County Medical Society and the New Mexico State Medical Society, was found dead in bed, on April first, of heart disease. Dr. Vogt was 41 years old, graduate of the University of Buffalo School of Medicine in 1916. He was associated with the United States Veterans' Bureau, and had been located in Albuquerque since 1919.

STAFF MEETING

City County Hospital (El Paso)
April 19, 1933

CASE DISCUSSION—Dr. Morrison: We have here an interesting case of mediastinal tumor, the exact nature of which we do not know. The patient is a Negro, male, age 61. Chief complaint: Cough and difficulty in breathing.

Present illness: His present illness dates from three months previous to admission, when following fall he had some dyspnea lasting for about fifteen minutes. Since that time has had attacks of dyspnea increasing in severity and occurring frequently at night. Attacks are brought on during day by exertion. Has noticed swelling of face but not of feet and ankles, legs or hands. An unproductive cough since beginning of illness. Saturate solution K. I. was given at Clinic for six weeks prior to admission, without improvement. It was discontinued because of appearance of dermatitis. The patient lost 30 pounds weight in the past three months.

Past history: Chancre of penis forty years ago.

Examination: Examination on admission revealed very little except dyspnea, cyanosis, weakness, and evidence of a recent loss of weight. There was marked distention and tortuosity of superficial veins of chest and upper abdomen. Lungs: Breath sounds were suppressed, but vesicular in character —no rales, no impairment of resonance. Heart: Negative—no enlargement, no murmurs or thrills —rate and rhythm regular. Blood pressure 120/74 (approximately the same in both arms).

Laboratory Reports: Blood Count: Hb. 90 per cent; white cells 19,800: polys 90 per cent; small lymphos 7 per cent: monocytes 3 per cent.

Blood: Kahn 4 plus.

The patient was in hospital three days. Rest relieved his dyspnea to some extent, and he left hospital against advice of physician. His temperature chart shows that only twice during his stay in hospital did his temperature run above normal: once 99.4° and once 98.8°. Pulse varied from 80/min. to 100/min.

X-ray of chest revealed a mediastinal tumor beginning to invade the hilus of right lung. The question arose as to the nature of this tumor, the most likely possibilities being: aneurysm, gumma, neoplasm.

In favor of aneurysm is his race, age, luetic history and 4 plus Kahn. Against aneurysm is the absence of any clinical evidence of this condition, and the character of the tumor as seen under the fluoroscope and x-ray plate. The tumor is not clear-cut enough for aneurysm—the margin is hazy and infiltrating the lung hilus.

From the appearance of the tumor it might well be a gumma. However, the sudden onset, rapid development, great loss in weight and blood count do not fit in with a diagnosis of gumma. This patient also had six weeks' treatment with K. I. with no improvement in symptoms. The rapid development, weakness, loss in weight, and infiltrating appearance of tumor would speak for malignancy, but we have a normal hemoglobin and no evidence of involvement of supraclavicular glands, which we would expect with a malignant growth of this size.

I know of no way of arriving at a definite diagnosis except by trying out intensive antiluetic therapy. If this failed to reduce the size of the tumor then possibly deep x-ray therapy would be indicated. In the presence of a tumor of the lymphosarcoma or malignant lymphoma type, this should result in very definite improvement.

This patient has promised to return for observvation. It is hoped that he will do this and that a correct diagnosis may be made.

Dr. Werley: Did he have much pain?

Dr. Morrison: No pain at all, except when he came in; at that time he had some pain in his right arm. He had no pain while he was in the hospital; his only complaint was respiratory distress and a dry, unproductive cough.

Dr. Awe: Did he have any enlarged glands?

Dr. Morrison: He had no enlarged glands anywhere.

Dr. Werley: There was no evidence of any erosion of those vertebrae back there, is there? (Referring to x-ray plate.)

Dr. Morrison: There seems to be very little space between tumor and vertebrae, but no evidence of any erosion, and there was no pain, as you would expect with erosion.

Dr. Gallagher: What appears to be infiltration there might be an old hilar tuberculosis, might it not?

Dr. Morrison: It might be. We have no history of any pulmonary symptoms, before onset of present illness, and we have a definite tumor mass.

Dr. Ralph Homan: I think the findings in the chest on physical examination would to a certain extent rule out carcinoma of the bronchus. If it is a sarcoma, the chances are 100 to 1 that it is of the mediastinum, and there would then have been a lower hemoglobin. I believe that the rough outline that we can see in this picture is more likely an old bronchiectasis that you can see on the other side also. If there is a tumor there, I think it arises in the mediastinal glands rather than in the lung tissue or the bronchial mucosa .

May 17, 1933

The case of mediastinal tumor presented at the last staff meeting re-entered the hospital March 22, 1933. Dyspnea, cough, loss of weight, more pronounced. Anti-luetic therapy was instituted but condition of patient became progressively worse, signs of fluid in right chest developed. X-ray of chest at this time revealed a marked increase in the size of the tumor with evidence of fluid in right pleural cavity. Patient died May 16, 1933. Diagnosis: Malignant tumor of mediastinum infiltrating hilus right lung.

Dr. Waite showed some x-ray pictures on the case.

Dr. Waite: This was a good-sized colored man, with some swelling of the head on the right side. He was said to have had some nervous and mental symptoms before he died, but there was nothing localizing, and we did not examine the brain at autopsy. There was nothing found at autopsy except one small metastasis in the lower margin of the liver. The right chest was full of clear fluid. The lung was collapsed. The left lung was voluminous and larger than we usually see, and we took it all out in one piece and have it here to show you. He had a markedly contracted lung surrounding a big solid mass, and when it was sectioned it was a dense white mass including the bronchus to this lung. We thought possibly this man had syphilis and an aneurysm. The heart and aorta were both normal, no sign of any involvement of the aorta or valves. There was no evidence grossly of syphilis. We have a definite tumor originating around the right bronchus, very dense. Microscopic examination of this tumor shows a definite adenocarcinoma with a tendency to secrete or form little cysts, so we have a carcinoma of the glands of the bronchi with a tendency to secrete mucus.

Copy of Dr. Waite's autopsy report, May 16, 1933:

Body is that of a good-sized colored man. No external marks of violence. The right chest is somewhat contracted. There seems to be some bulging over the right side of the head. On section there is nothing of especial significance in the abdomen except for a small nodule in the midline of the liver at the lower margin. On opening the chest, the right side is full of straw-colored fluid. The lung is col-

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lapsed. On the left side it is free of fluid. The lung is voluminous and somewhat bound down with adhesions. The heart and lung are removed in one piece. The right lung is markedly contracted, and there is a dense growth about the hilum, extending into the lung substance. On section there is a dense mass of pale grayish tissue involving the hilum and mediastinum, with a large projection encroaching on the main bronchus, practically occluding it. The left lung is air-containing and in good condition. There is considerable thick grayish-yellow pus exuding from the bronchi to the right lung following section.

Gross Diagnosis: Carcinoma of the right bronchus. Contraction of the right lung. Purulent bronchitis on the right side. Hydronephrosis, left kidney. (Left kidney on section showed distended pelvis and calices.)

May 18, 1933. Gross examination of the heart and aorta shows a slight degree of sclerosis of the aorta. Heart and valves in perfect condition. No evidence of aneurysm.

Microscopic examination of the nodule in the liver shows a new growth made up of epithelial cells in a definite glandular arrangement, and in places there is apparently some secretion forming small cysts.

Diagnosis: Adenocarcinoma, bronchus.

May 20, 1933: Examination of the heart shows a nodule projecting from the growth into the right auricle.

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Phoenix, Arizona.

RESUME OF OBSTETRICAL CASES DURING 1931-1932

F. C. JORDAN, M. D.

There were 450 deliveries at the Good Samaritan Hospital during 1931. These may be classified as follows:

Spontaneous deliveries	370
1. Cephalic presentations	352
2. Breech presentations	18
	370
Forceps deliveries	61
Cesarean sections	16
Monstrosities	3
	450

There were sixteen stillborn. Six babies died within one hour, and there were three maternal deaths. One mother died of epilepsy, one of eclamptic toxemia, and one of ruptured lower uterine segment with massive hemorrhage.

The records as a whole were more complete than those of the preceding year. Pelvic measurements were charted in less than 50 per cent of the cases. The indications for cesarean section were apparently insufficient in some of the cases. The most common fault was the failure of the physician to write each diagnosis, procedure, and complication on the admission sheet. If this were done our historian could properly classify the charts and they would be of value for statistical purposes.

M. C. FLOHR, M. D.

During the year 1932 there were 367 deliveries in the hospital. This is a decrease of 83 deliveries from the previous year. As we all know, during these times of financial stress, there have been more deliveries in the home than there have been for some few years. For this reason our statistics of operative obstetrics may seem to be a bit high. I have been unable to obtain the figures for 1931 but have those for this year. There were 1880 deliveries in the city of Phoenix; of these, 757 were in the hospitals.

In this hospital there were 280 normal cases and 87 abnormal cases, including under cesareans, forceps, and breeches. There were 30 cesareans, an incidence of 8.2 per cent. According to Cook of Galveston, the incidence rarely exceeds 3 per cent. This apparently high incidence is, I believe, evidence of the fact that most of the normal cases are being delivered at home and only those that were anticipating trouble enter the hospital.

Forceps—There were 39 cases, an incidence of 10.6 per cent. According to Plass, this is low. His figures are 12.2 per cent for the entire state of Iowa, with 24 per cent in the hospital and 8 per cent in the home.

Breeches—There were 18, an incidence of 4.9

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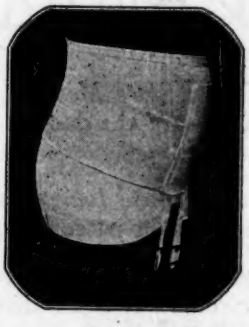

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per cent. This is a bit high. Studdiford gives the incidence of breech presentation as approximately 3 per cent. However, in the group here we must include two sets of twins—of the four babies three of them being breeches—and two seven-and-a-half-month, dead, macerated fetuses. There were two versions during the year.

Of the minor obstetrical operations there were quite a few, and I believe a brief review of them would be of interest. They were as follows:

Episiotomies	96
Perineal tears	
1st degree	63
2nd "	29
3rd "	1
(Perineorrhaphies	24)
(Perineorrhaphy and hemorrhoidectomy	1)
(Trachelorrhaphy	1)

Among the obstetrical complications which could be determined by a brief perusal of the charts were as follows:

Hemorrhage	3
Eclampsia	5
Placenta previa	3
Abruptio placenta	1
Precipitate delivery	3

The number of hemorrhages noted appears to be rather small. This is due to the fact that the doctors have still not learned to make all the necessary notations, especially on the front sheet, where space is provided for each diagnosis.

The mortality rate was very gratifying. No mothers died during the year. There were, however, nine babies which died within the first 24 hours or were still-born. Two of these were apparently difficult breech cases. Two were extremely difficult forceps deliveries, where apparently everything had been done that was possible. For instance, one was a 9 pound, 6 ounce baby in a generally contracted pel-

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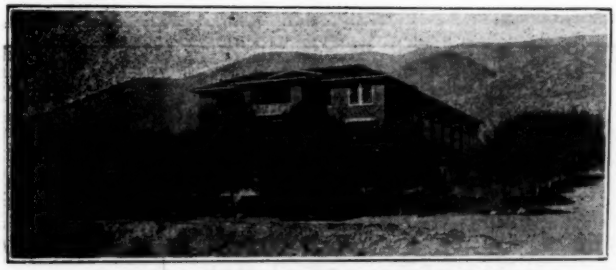

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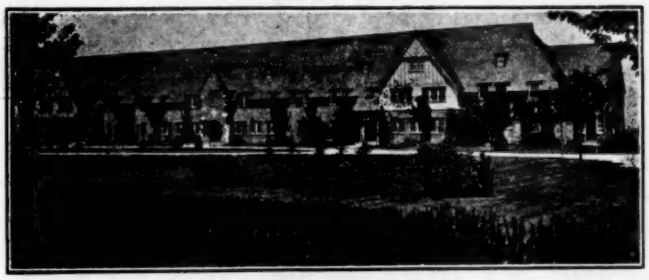

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vis on which a forceps delivery had been attempted in Gila Bend before being sent to the hospital in Phoenix. These four charts were very well and completely written up. In explanation of the other five: two were four-pound twins with a diagnosis of hydramnion; the other three were premature babies and, in spite of everything that was done, they were just too small to be saved.

Morbidity. The figures are rather surprising. In going over the charts I used as a criterion the old British Standard of puerperal infection, which was as follows: A patient whose temperature reaches 100° at any time is considered as a morbid case, or one of puerperal infection. I made no effort to distinguish between the long-drawn-out infected cases and those in which the temperature reached this mark only once. However, in passing, I may state that the apparently severely infected cases, as indicated by a temperature over a period of five to ten days, were very scarce. Of the 280 normal cases, 110, or 39 per cent, were morbid. Of the 87 operative cases, 35, or 40 per cent, were infected.

Now a brief resume of the spontaneous cases, cesareans, forceps, and breeches.

SPONTANEOUS CASES—280

Morbidity	110
Eclampsia	3
Voorheis bag	2
Polyhydramnios	2
Placenta praevia	2
Dead babies	7

CESAREANS—30

Classical	13
Low cervical	17
Test of labor (c)	3
" " " (1. c.)	6

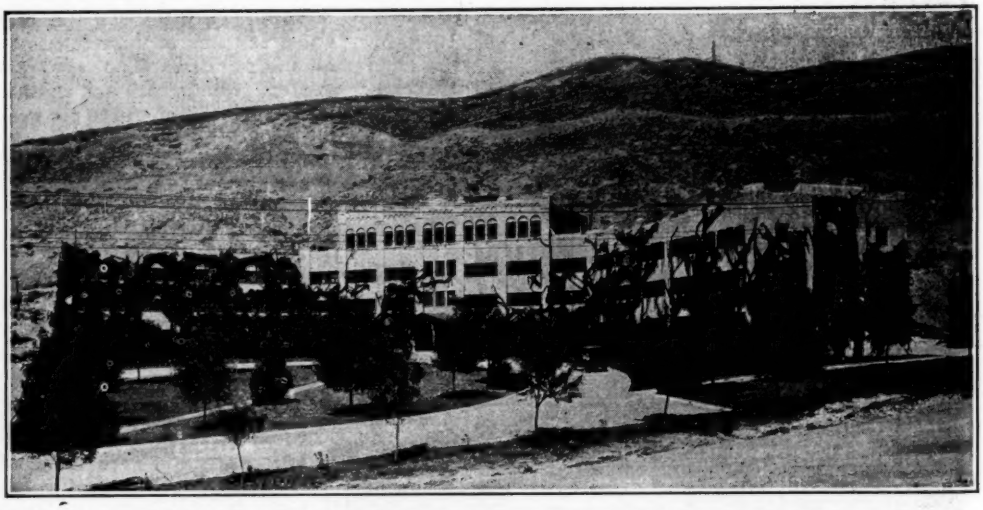
Indications:

Previous cesarean	9
Contracted pelvis	8
Large baby	4
4 hours of pains (without progress)	4
Elderly primipara	3
Previous severe dystocia	2
Eclampsia	2
Placenta praevia	1
Polyphydramnios (with previous dystocia)	1

Of course, many of these cases had several of these indications listed. In looking over the charts, I noticed that there were ten of them which had no measurements of the pelvis noted. Among these ten were two in which the diagnosis of contracted pelvis was given as the indication for the operation. In four cases there were no consultations. On four of the charts there was no notation as to why the operation was performed.

BREECHES—18

Versions	2
Morbidity	5, or 27 per cent
Deaths	2, or 11 per cent



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FORCEPS—39

High	2
Mid	20
Low	17
Manual rotations	6
Morbidity	12, or 30 per cent
Dead babies	2
Indications:	
No progress 1 hr. (2d stage)	18
Small pelvis (meas.)	16
F. H. T. distressed	12
Pt. uncooperative	10
Large baby	8
Funnel pelvis	3
Congenital heart disease	2
To protect old perineal scar	2

Now there is an additional and very interesting group of 15 in which nothing whatsoever is noted on the chart as an indication for forceps delivery. On most of them the notation has been made "forceps del." But no attempt was made to give any indications. Most of these charts were also without measurements of the pelvis.

It was interesting to note the attempts made to relieve the pa'ients' distress by the various forms of analgesia. I will note briefly what was used.

Pantopon and scopolamine	47
Morphine and scopolamine	62
Morphine	12
Sodium amytal	
gr. 3	5
gr. 6	50
gr. 9	6
gr. 12	2
gr. 5 (I. V.)	1
Rectal ether	1

Practically all of these patients and nearly all of the rest had ether and a very few chloroform to relieve the pain.

In summing up our figures for the year we see that we have had 367 deliveries, of which 8.2 per cent were cesareans and 10.6 per cent were forceps, these figures varying as previously noted.

To me the most important bit of information I obtained through the study of these charts was the fact tha' the percentage of morbid cases was so high. It seems to me that taking note of this fact should be one of the first steps and one of the best steps toward profiting by the records that we have made during the past year. We must endeavor by some means to reduce this percentage.

In spite of all the work that could be put in on compiling statistics from these charts we could never gain any worthwhile information from them. It is all too inaccurate and too incomplete. The fault I do not believe is in the chart forms but in the failure of the physician to see that they are properly filled out. Closer attention to this matter at the time the chart is in use will make it possible at the end of the year to have records that will be of some definite value to us.

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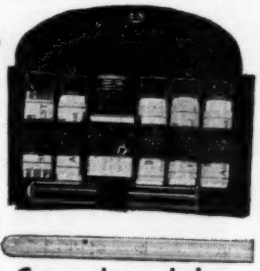

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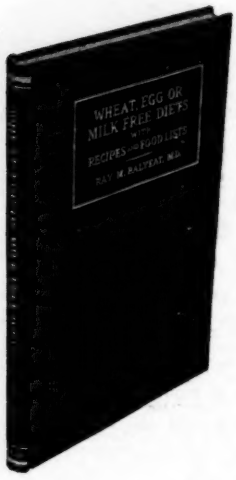

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